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POPULAR Computing WEEKLY

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BRITAIN'S BEST-SELLING MICRO WEEKLY

Hobbit competition — p.47

News Desk

Amstrad machine is announced

ALAN Sugar, Amstrad's chairman, has now formally announced the Amstrad home computer

Called the CPC 464, the machine will be offered in four versions System 1 consists of the CPC 464 console with green screen monitor, priced at £229 System 2 replaces the green screen monitor with a colour monitor for £329 Systems 3 and 4 are the same as 1 and 2, respectively, except a single 3in Hitachi disc drive is also included running CP/M These latter options are priced at £429 and £529

The two disc versions result from a licencing deal with Digital Research for the CP/M 2 2 disc operating system

Amstrad plans to deliver the first batch of 1,000 machines to stores in June and by Christmas expects to have produced over 200,000 machines, all of which have already been underwritten by the major chain stores

The CPC 464 is to be sold initially by Boots, Dixons, Comet (recently bought by Woolworths) and Rumbelows.

The CPC 464 — reviewed in this issue — has a Z80 processor, with 64K Ram and 32K Rom The machine also features a built-in cassette unit

According to Alan Sugar, the machines demonstrated at the launch were production run units with finished Roms, which means that Amstrad may well avoid embarrassing delivery delays

Software for the CPC 464 also looks healthy By June

continued on page 5 ▶



Alan Sugar, Amstrad's chairman

Tatung launches micro

TAIWANESE electronics giant, Tatung, this week launches its first home computer — developed and manufactured in the UK

The machine is Z80A based with a professional quality keyboard, 64K Ram and has a single 3inch Hitachi disc drive built in

The machine runs a version of Basic similar to Microsoft Basic and its disc operating system is similar to Digital Research's CP/M According to a company spokesman the machine will be able to run programs written for CP/M

Screen display is both 40 and 80 columns and it has a graphics mode of 256 x 192 pixels.

The machine has both RS232 and Centronics printer interfaces

Tatung — ▶

This Week

● **Reviews** *Andy Pennell looks at the CPC 464 micro from Amstrad on page 16* ● **Programming** *Ian Goldsack presents a bubble sort program for the BBC See page 20* ● **Dragon** *Jason Orbaum and Geoffrey Campbell explain some of the intricacies of different addressing modes on page 27* ● **New Releases** *This week's reviews include* Millionaire *from Incentive and* Pigs in Space *from Ace Page 56*

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This Week

Editorial

The launch of the Amstrad CPC 464 and the imminent arrival of the MSX machines could change the face of the UK micro market

The Amstrad machine is based upon an elder statesman among microprocessors — the Z80 chip However, it comes complete with its own monitor, built-in cassette recorder, 64K Ram and 32K Rom all for just £229 In addition, software support is promised in the form of 50 programs when the CPC 464 hits the shops in June

With large chain stores such as Comet, Boots and Rumbelows already agreeing to take the Amstrad in quantity, it looks set to make quite an impact on the market — though this does depend on the machine being readily available, in quantity, on time

This will undoubtedly affect those companies which are already losing their share of the home market, notably Camputers and Dragon. It could also conceivably hit Sinclair's still invisible QL, particularly as an Amstrad disc drive should also make its debut soon

With the marketing muscles of the MSX companies added to the fray, Commodore, Sinclair and Acorn will suddenly find themselves faced with their first real outside competition

Christmas 1984 is likely to be an even bigger micro buying spree than Christmas 1983 It is also starting to look as if there will be a much wider choice of machines

Next Thursday

Next week's star game is Ye Olde Castle for BBC B by Simon Pitners, in which you must rescue the princess from the castle

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Library access for micro owners

SPECTRUM, Commodore 64 and Oric owners are soon to have access to the library of software — now extending to over 5,000 titles — available under the CP/M operating system

ITL Kathmill, maker of the Byte Drive 500 disc unit for the Oric, has concluded a deal with CP/M's owners, Digital Research, to implement the operating system on its disc configuration

The company will shortly announce its CP/M disc system for the 48K Spectrum For around £150 the company will offer a disc interface unit which plugs into the expansion connector on the Spectrum The unit will provide 16K Ram (bringing the Spectrum's memory up to the 64K level required by CP/M), an RS232 port, a Centronics printer interface, a disc connector, a continuation of the Spectrum's own expansion bus and a floppy disc containing the CP/M 2 2 disc operating system software

Up to four disc drives can then be plugged into the interface — even of a variety of types 3inch, 3½inch and 5¼

ITL will also be selling its own 3inch drives, compatible with the system at £192 These are double-sided double-density drives with a formatted capacity of 220K per side

The interface unit for the Spectrum is expected to be ready in May The disc drives are available now

Both the Oric and Commodore 64 versions of the system are not expected to be ready until September Neither machine is Z80-based, so the interface units will include a Z80 chip as a second processor together with 64K Ram In the case of the Oric 1 and Atmos version, the unit will also feature a built-in modem

For the Spectrum, the company will also offer a non-CP/M version of the disc system without the CP/M operating system disc and without the extra 16K Ram This is expected to sell for around £100

Amstrad

◄continued from page 1

some 50 cassette titles will be finished About 22 titles are running now

These will include educational titles from Bourne Software, a wordprocessor from Juniper, Pascal from Hisoft and a promising selection of games conversions These include *Codename Mat* and *Haunted Hedges* from Micromega two titles from Indescomp *Roland in the Cave* and *Roland on the Ropes* (better known in this country as Quicksilva's *Boogaboo* and *Fred*), *Mr Wimpey*, *Hunchback* and *Fengwyn* from Ocean, *Microbot* from Softek and several titles from Romik

An assembler/disassembler is in the pipeline and Softek is working on a Basic Compiler

The CPC 464 is to be launched simultaneously in the UK, Franch and Germany At present there are no plans to sell the Korean manufactured micro in the US

Tatung micro

◄continued from page 1

Taiwan's largest company — took over Decca's consumer electronics division three years ago and the new micro will be manufactured at its plant in Bridgnorth, Shropshire

The machine is expectud to be priced at the upper end of the home micro price range

ASA takes notice

THREE months after Sinclair first began taking orders for non-appearing QL computers, the Advertising Standards Authority has begun to take notice

Following complaints from customers still waiting for their machines the ASA, according to its spokesman, is now "persuing an investigation against Sinclair"

Although the ASA has no legal weight it can bring to bear on the problem, it can advise publishers to refuse to carry advertisements placed by Sinclair

● *PCW*'s QL order Week 13. Hopes raised last week now appear peemature If we are lucky one of us will spend six hours with one of the beasts some time this week — supervised by a Sinclair employee. This is volume production?

Valhalla converts to CBM 64

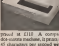
THE award winning adventure game *Valhalla* is being converted to run on the Commodore 64 The game itself will be identical to the Spectrum version, but Legend are concentrating on improving the graphics for the 64

Priced at £14 95, it should be available from the beginning of May

Epson launches new printers

EPSON has launched four new printers

The P40 thermal printer is



priced at £110 A compact dot-matrix machine, it prints at 45 characters per second with 40 characters a line. Varying the character mode will produce either 80 or 20 characters to a line

Rather more expensive is the Epson P80 thermal transfer printer. It uses sheet paper, printing at 45 characters a second in true 80 column mode The P80 is battery operated, although rechargeable batteries can be used It costs £164

The other two units announced are the HI-80 colour plotter and the Jx-80 colour printer



Oric completes its shake-up

ORIC has now completed an internal reorganisation, begun after its takeover last November by Edenspring Investments



John Tullis

John Tullis has stepped down as chairman, with his place being taken by the present Edenspring chairman, David Duguid. John Tullis leaves to devote time to his other business interests, although he will still act as a consultant to Oric

Barry Muncaster remains as managing director, a post he now holds jointly with Edenspring's managing director, Peter Jones Barry also becomes a joint managing director of Edenspring

Rental plans for Falconhurst

VIDEO hire specialist Falconhurst plans to begin renting out computer games for the Spectrum and Commodore 64

The company has 150 video outlets throughout the country — mainly inside independent grocery stores The titles will be hired out by a related company, Falconsoft for as little as 50p per night or £2 for a week

Falconsoft spokesman John Le Mesurier said "The reaction from software houses has generally been hostile, but there is nothing they can do about it

"Computer games are just not worth the £6 or so they are charging for them "

Letters

Public-key ciphers

Regarding your correspondent who does not believe in the efficacy of public-key ciphers he can, of course believe whatever he wants to, but the fact remains that they work and are relied upon by a great number of people

Yes, we all know how good one-time pad is, but there is still the problem of secure communication of the pads in the first place

If he wants to generate true random numbers I would suggest that he thinks in terms of using the vast number of natural noises in the environment, in such a way that they interact with each other I have a system which uses a combination of a microphone attached to the bottom of a bird cage, another attached to the aquarium, one placed where it picks up wind noise, and a temperature sensor in a very draughty situation

As far as encryption of data over BT circuits is concerned, I can assure you all that it is not only allowed, but encouraged by BT (for further information see the PSS technical guide) Also, when using a modem to communicate with another one via the PSTN, there is no requirement to use any particular baud rate, as long as you don't try to exceed the maximum, which allows techniques such as baud rate hopping I have implemented such a scheme for a number of organisations and their computer systems have never yet been 'broken into'

As far as the German Enigma machine is concerned, it should not be dismissed too lightly An emulation of that machine (with improvements) is sold by one of the major software houses for the TRS-80 They also offer an encrypted message, which if you like to send in the solution, they will pay you £250 The prize has not yet been claimed, although I know for a fact that the message has been decrypted by a few people, but they are not in a position to publicise the fact

Finally, I must say that if your correspondent seriously thinks that there is a lot of misinformation on the subject, then it shows just how little he knows about it

P G Strangman
Dept of Computing and Maths
The Polytechnic
Wulfruna St
Wolverhampton WV1 1LY

Printing pokes

After buying a Seikosha GP50A printer I discovered that the *LList* command did print the program lines, but the printer did not linefeed after each line, thus printing the entire program on the same line

To correct this, *Poke 330,2* to enable the linefeed after each line Type *Poke 330,1* to disable linefeed

Other *Pokes* that may be of use when printing are *Poke 329,255* to put upper case 'on' and *Poke 329,0* for lower case case

Neil Ritchie
35 Underwood Ave
Worsbrough
Barnsley
S Yorks

Thank you for the *Pokes*. If any other readers have any interesting *Pokes* or routines, please send them in.

Overloaded cables

This is just to let you know that my wife has threatened to leave me, the bank manager has written to me advising that I should go back to work and the electricity board have replaced all the street's cables due to an overload originating from my home

'Why' I hear you ask *'Jet Set Willy'* I reply It must be one of the most addictive and frustrating games ever (*Manic Miner* bites the dust)

To date, I have stumbled across 55 screens and found 73 items (not collected them all yet though) Can there be any more I ask myself?

Enough of the praise — lets get down to the nitty-gritty One side of my tape doesn't load, which isn't too bad as I have still got the other side But, after about 30 minutes playing, sometimes the program corrupts itself and I find that if I enter the kitchen, under Megatree or the East Wall base, *Willy* automatically gets killed off for no apparent reason Should I change my tape or not?

Simon Lilley
21 Roberts Street
Rushden
Northants

From the sound of it, the side of the tape that loads is perfectly OK It may be that the Spectrum is overheating, which could cause the program to corrupt itself

I would advise trying the program on a friend's machine. If the same problem occurs, then the tape is probably faulty and should be exchanged. If the problem does not occur, then the fault probably lies with the machine.

Ace on Spectrum

I own a 48K Spectrum and Abersoft's Forth Can you tell me if there is a possibility of running Jupiter Ace listings on my Spectrum with my Forth program loaded?

Also, are Eproms available for the Spectrum? If so, how much do they cost and are they available from retailers?

Please could you settle a slight argument between myself and my friends Which do you think is the best joystick, The Quickshot (original), the Kempston competition Pro 5000, or the Pointmaster Pro?

Paul Bryant
33 St Marys Rd
Gillingham
Kent ME7 1JJ

A Jupiter Ace listing might Run on your Spectrum, if you avoided all graphics and *Pokes*

Eproms are available for the Spectrum Eprom Services, 3 Wedgewood Drive, Leeds LS8 1EF, offers an 8K Eprom board complete with a programmed toolkit Epram for £20 95.

As for the joysticks, it's very much a matter of taste, but I'll admit to being slightly inclined towards the Kempston.



"Complaining to the Advertising Standards Authority about Sinclair helps to pass the time while I'm waiting for my QL."

Software exchange

I am writing in response to a letter in your April 12 issue headlined "Ban the swap shops" The writer seems to make a dangerous assumption about software exchange clubs such as UK Software Exchange Club The inference is that programs members will receive in return will be pirated copies

As far as my own club is concerned, nothing could be further from the truth If the author of that letter would care to name names concerning who is offering pirated copies, then action could quickly be taken against the offending clubs

I suspect that the writer was meaning to say that it was private individuals who were responsible for these sort of offers, but the point was not clearly made and I feel that I should have the opportunity to set the record straight

My club deals solely in originals which must be complete in every respect including all documentation If anyone wants to be sure that they will not receive pirated programs in return for their exchange software, then they should avoid the adverts which look too good to be true and stick with an established club such as UKSEC

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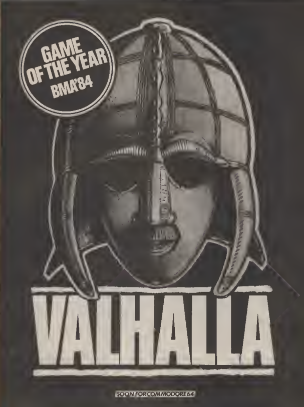
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GAME
OF THE YEAR
BMA'84
VALHALLA
SOON FOR COMMODORE 64

Tank Battle

A new game for 48K Spectrum by Julian Chowdhury

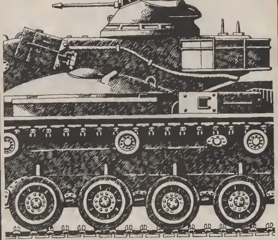
This arcade style game is called *Tank Battle* The object of the game is to blast the tanks coming up the screen. But be careful! The tanks can fire back at you, diagonally left and right, and straight up The direction is purely at random You have only three lives and must, obviously, avoid the tank fire

Blasting enough tanks will move you to the next level where your fuel will be restored and a bonus will be given The highest points will be given for hitting the tanks on their turrets when they are far away

The program could be speeded up slightly by taking out the Rem statements or removing the sound

Graphics

Line 1110 Graphics GH & Line 1130 Graphics IJT
Line 1140 Graphics AB & Line 1160 Graphics CD
Line 1160 Graphics EF
Line 7030 Graphics KL & Line 8020 Graphics OP
Line 8030 Graphics MN & Line 7510 Graphics Q



```
   5 REM
  10 LET high=0
  20 PAPER 0: BORDER 4: INK 3: C
LS
  30 GO SUB 9000
  40 LET z=7
  50 LET ee=1
 100 GO SUB 1000: REM set variab
les
 110 GO SUB 2000: REM set screen
1000 REM
1010 LET sc=0
1015 LET c=1
1020 LET x=1: LET y=10
1030 LET fuel=100
1035 LET lives=3
1040 DIM a(4)
1050 LET p=0
1060 LET z1=z
1100 DIM a$(2,2)
1110 LET a$(1)="
1120 LET a$(2)="
1130 DIM b$(3,2)
1140 LET b$(1)="
1150 LET b$(2)="
1160 LET b$(3)="
1170 LET c$="
1180 DIM d$(2,2)
1190 LET d$(1)="
1200 LET d$(2)="
1300 RETURN
2000 REM
2001 PRINT
2002 LET line=INT (RND*27)+2
2005 IF fuel<=0 THEN GO TO 6600
2010 PRINT AT 0,0;"SCORE=";: FLAS
H 1;sc;: FLASH 0;" LIVES=";lives
2020 PRINT AT 0,20;"FUEL=";: FLAS
H 1;fuel
2030 IF z<0 THEN GO TO 9500
2035 BEEP .1,0
2040 POKE 23692,-1: PRINT AT 0,0;
"SCORE=";: FLASH 1;sc;AT 0,11;: F
LASH 0;"LIVES=";lives;AT 0,20;"F
UEL=";: FLASH 1;fuel
2050 LET a=USR 3000
2060 FOR n=1 TO 3: PRINT AT x,y;
INK 3;a$(1);AT x+1,y; INK 3;a$(2
);AT x,y;"  ";AT x+1,y;"  ": PR
INT AT 0,0;"SCORE=";: FLASH 1;sc;
AT 0,11;: FLASH 0;"LIVES=";lives;
AT 0,20;"FUEL=";: FLASH 1;fuel: P
RINT AT 21,line; INK 1;b$(n): PR
INT : NEXT n
2080 PRINT AT x,y; INK 3;a$(1);A
T x+1,y; INK 3;a$(2): PRINT AT 0
,0;"SCORE=";: FLASH 1;sc;AT 0,11;
: FLASH 0;"LIVES=";lives;AT 0,20;
"FUEL=";: FLASH 1;fuel
2700 GO SUB 3000
2900 GO TO 2002
3000 REM
3010 LET rnd1=-1
3015 LET rnd=INT (RND*25)+3
3017 LET rnd1=INT (RND*25)+3
3018 LET rnd2=INT (RND*28)+3
3020 LET count=count+1
3030 LET angle=INT (RND*3)+1
3035 LET a(c)=line
3050 PRINT AT x,y; INK 3;a$(1);A
T x+1,y; INK 3;a$(2)
3075 PRINT AT x,y;"  ";AT x+1,y
;"  "
3100 LET y=y+(INKEY$="8" AND y<2
9)-(INKEY$="5" AND y>2): IF INKE
Y$="8" OR INKEY$="5" THEN LET fu
el=fuel-1
3160 IF SCREEN$ (x+2,y)<>" " THE
N GO SUB 5000
3170 PRINT AT x,y; INK 3;a$(1);A
T x+1,y; INK 3;a$(2)
3180 IF INKEY$="0" THEN GO SUB 7
000
3200 IF count>0 THEN RETURN
3400 GO TO 4000
3500 RETURN
4000 REM
4100 LET c=c+1: IF c>4 THEN LET
c=1
4110 IF p<4 THEN LET p=p+1
4150 FOR n=1 TO p
4160 IF rnd=a(n) OR rnd1=a(n) OR
 rnd2=a(n) THEN GO TO 6000
4170 NEXT n
4200 NEXT n
4300 GO TO 3015
5000 REM
5005 GO TO 6000
6010 IF angle=2 THEN GO TO 6100
6020 IF angle=1 THEN PRINT AT n,
line; INK 1;"\": GO TO 6100
6030 IF angle=3 THEN PRINT AT n,
line; INK 1;"/": GO TO 6100
6050 REM
6060 FOR n=2 TO 18
6065 IF ATTR (n,line)=49 AND ATT
R (n,line+1)=49 THEN GO TO 6010
6070 NEXT n
6080 GO TO 2000
6100 REM
6105 PRINT AT x,y; INK 3;a$(1);A
T x+1,y; INK 3;a$(2)
6108 LET x2=n: LET y2=line
6110 LET x1=n-1: LET y1=line
6190 FOR n=x1 TO x STEP -1
6200 PRINT AT x1,y1; INK 0; OVER
 1;"*": BEEP .003,x1
6205 IF ATTR (x1-1,y1)=51 OR ATT
R (x1-1,y1-1)=51 OR ATTR (x1,y1)
=51 THEN GO TO 8500
6210 PRINT AT x1,y1; OVER 1;"*"
6215 IF angle=1 THEN GO TO 6240
6220 IF angle=3 THEN GO TO 6248
6230 LET x1=x1-1: GO TO 6250
6240 LET y1=y1-1: LET x1=x1-1: I
F y1<2 THEN LET y1=30
6245 GO TO 6250
6248 LET y1=y1+1: LET x1=x1-1: I
F y1>29 THEN LET y1=2
6250 NEXT n
6270 PRINT AT x2,y2; INK 1;" "
6300 RETURN
7000 REM
7005 LET fuel=fuel-8: PRINT AT 0
,20; FLASH 1;fuel; FLASH 0;" "
7010 LET r=x+2: LET t=y
7030 PRINT AT r,t; INK 0;"*";AT
r,t
7032 BEEP .003,r
7035 IF SCREEN$ (r+1,t)<>" " THE
N GO TO 7500
7040 IF SCREEN$ (r+1,t+1)<>" " T
HEN GO TO 7500
7050 IF r<21 THEN LET r=r+1: GO
TO 7030
7060 RETURN
7080 PRINT AT r,t;" "
7085 GO TO 7030
7500 REM
7505 GO TO 7500
7510 PRINT AT r+3,t;"  ";AT r+2,
t;"  ";AT r+3,t;"  ": BEEP .08,5
0: PRINT AT r+1,t;"  ";AT r+2,t;
"  ";AT r+3,t;"  ": GO TO 2000
7500 IF ATTR (r+1,t)=49 AND ATTR
 (r+1,t+1)=49 THEN LET sc=sc+z:
LET z=z-1: GO TO 7510
7510 IF ATTR (r+1,t)=49 AND SCRE
EN$ (r+1,t+1)=" " THEN LET t=t-1
: LET sc=sc+INT (RND*5)+1: LET z
=z-.5: GO TO 7510
7520 IF SCREEN$ (r+1,t)=" " AND
ATTR (r+1,t+1)=49 THEN LET t=t+1
: LET sc=sc+INT (RND*5)+1: LET z
=z-.5: GO TO 7510
8500 REM
8510 PRINT AT x1,y1;" "
8520 PRINT AT x,y;"  ";AT x+1,y;
"  "
8530 FOR n=5 TO 32: BEEP .01,n:
NEXT n
8540 PRINT AT x,y;a$(1);AT x+1,y
;a$(2)
8550 LET lives=lives-1
8560 IF lives<1 THEN GO TO 8600
8570 GO TO 2005
8600 CLS : FOR n=0 TO 7: BORDER
n: NEXT n: BORDER 4
8610 IF sc>high THEN LET high=sc
: PRINT AT 10,0;"WELL DONE!!! YO
U HAVE A THE HIGH SCORE."
8620 PRINT AT 4,0;"HIGH SCORE=";
high: BEEP 1,0
8650 PRINT AT 15,0;"DO YOU WANT
TO PLAY AGAIN? (y/n)"
8670 IF INKEY$="n" THEN GO TO 88
00
8680 IF INKEY$="y" THEN CLS : GO
 TO 80
8700 GO TO 8670
8800 STOP
8900 REM
8910 LET z1=z1+5: LET z=z1
8920 CLS
8930 PRINT AT 2,0;"YOU HAVE KILL
ED WAVE ";ee;"!": PRINT TAB 10;
 FLASH 1;"BONUS!!!!": FLASH 0: L
ET sc=INT (sc*1.5)
8940 LET fuel=100
8945 LET ee=ee+1
9000 REM
9010 FOR n=144 TO 160
9020 FOR i=0 TO 7
9030 READ a: POKE USR CHR$ n+i,
a
9040 NEXT i
9050 NEXT n
9100 DATA 3,3,3,3,1,1,1,33,192,1
92,192,128,128,128,128,128,116,1
18,117,117,118,118,118,119,255,2
9,174,174,46,255,14,238,113,114,
116,118,113,100,119,32,142,72,62
,238,142,30,250,4
9110 DATA 7,56,60,100,80,56,1,1,
224,44,124,64,60,238,128,126,7,2
0,1,1,1,3,3,3,224,168,128,128,12
8,192,192,128
9120 DATA 0,1,2,4,4,8,1,0,0,128
64,32,32,64,128,0
9130 DATA 0,0,0,0,0,0,0,0,33,2,7,1
4,24,48,96,192,196
9140 DATA 64,224,112,24,12,8,3,0
5,0,0,0,0,0,6,0,130
9150 DATA 85,170,85,170,85,170,8
5,170
9500 REM
9510 PRINT AT 0,10;"TANK BATTLE"
: PRINT AT 0,10; OVER 1;"________
___": OVER 0
9520 PRINT "   The object of t
he game is to   destroy as many
tanks as you    can."
9530 PRINT "    You can score mo
st points by    hitting the cent
re of a tank."
9540 PRINT "    You also have 10
0 units of      fuel. This is los
t by: ": PRINT "     Moving left or
 right- 1 unit     Firing- 8 unit
s."
9560 PRINT "      BEWARE The tanks
 fire back      in three directi
ons!"
9570 PRINT
9575 PAUSE 0
9580 FLASH 0
9590 CLS
9600 PRINT AT 0,12; FLASH 1;"CON
TROLS"
9610 PRINT "      Press 5 to move
to the left"
9615 PRINT "      Press 8 to move
to the right."
9620 PRINT "          0 to fir
e"
9630 PRINT
9640 PRINT
9645 PAUSE 0
9650 CLS
9660 RETURN
```

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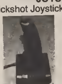
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20:20 vision

***Christina Erskine** talks to Clement Chambers of CRL*

The legend of the computer whizz-kid earning a million before the age of 18 is almost personified in Clement Chambers. Not quite, because Clement has now turned 20, and he's not a millionaire — yet.

Clement has been managing director of Computer Rentals Ltd for close on two years now. He can hardly be said to have worked his way up from the bottom.

"After leaving school, I wasn't entirely sure what I was going to do because I was far too thick for university," he said wrily. "I didn't particularly want to work for anyone else, so it seemed a good idea to set up my own company."

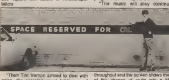
His first idea for a business explains the company's somewhat inappropriate name.

"I started out with plans to rent out hardware, but negotiations with the manufacturers fell through, so I was left with a company but no product. I decided to have a go at the other end of the market and sell software instead."

Not that Clement was at all worried by his false start. He was attracted by the fact that the computer market was new and undeveloped, and he hoped he wouldn't need a vast amount of capital. Supreme youthful confidence convinced a bank that lending him £30 000 would reap dividends, and a half page advertisement in a computer magazine gave CRL its first six programs.

"The response to that ad was even better than I'd expected. I'm still getting the occasional reply to it now.

"After that, things grew extremely quickly. I'd paid off the bank in two months, and I ned to take on more staff fairly fast. CRL began with me and a part-time secretary in 500 square feet above a Whitechapel tailors.



"Then Tim Vernon arrived to deal with sales, the secretary went full-time, and Ashley, an old schoolfriend, who'd been helping with the administration on an informal basis, joined the payroll."

CRL's next venture was the production of a Z80 based, infra-red driven robot. It was made by a team of schoolboys from Ilford County High School and Clement took them all to Madrid for the Robotics World Championships where it won a prize in the Novices section.

"We're currently developing the robot for the commercial market, but its launch has been considerably delayed by the shortage of chips. But we've got two people working on it at the moment and when it does come out, it'll be under £100."

In October 1983, CRL moved to self-contained premises in Stratford, and Clement began raising his profile.

"I stopped driving my Mini Metro, and bought a BMW. It was bad enough when people looked down their noses at me because of my age, but I stood no chance at all with a Mini. Then I spotted an advertisement in *The Times* for the number plate CRL 1. It set me back £3,000, but I get taken a lot more seriously now."

CRL has now published over 40 titles, and exports widely to countries as diverse as Iceland and New Zealand. It also has two particularly big projects on hand at the moment.

One is the adventure game *War of the Worlds*, based on Jeff Wayne's music — rather than HG Wells' book — and with a target launch date of June 1.

"The venture started almost by accident," said Clement. "One of our programmers wanted to call his latest program *War of the Worlds*, and I pointed out that the title already existed. But the name and idea stuck in my mind. It occurred to me that it would make a very good game itself.

"Having found out that Jeff Wayne held the rights to the name, we came to an agreement and set about turning it into a program for the Spectrum.

"The music will play continuously throughout and the screen shows the story of the change of earth into a Martian environment and the player is the narrator, a journalist.

"Although it's fundamentally an adventure game, it's an attempt to blur the distinctions between adventures, strategy and arcade games. It will include the best elements from games such as *The Hobbit* and *Valhalla*, such as the interaction between characters and add some new ones as well.



"Actually, all we've got so far is half an hour's worth of landscape, but I'm confident it'll be finished on time."

The second project is to produce a game based on *The Magic Roundabout*. Clement is in the process of tying up a deal to give CRL the rights to the title. Fans of Zebedee and Florence *et al* will doubtless be glad to hear that there will be no shoot-outs or intergalactic warfare involved.

"We're thinking along the lines of a non-violent arcade game for a number of machines," Clement explained, "but it's hardly got off the ground yet, so I don't know quite how it will turn out."

Not that CRL will run down their normal games output. With five programmers among the 11 full-time staff, a new game is expected to begin production about once a fortnight, including conversions of existing games for different machines.

Clement however would like to see CRL grow bigger and bigger.

"While CRL are not going in for expansion just at the moment, we'll certainly be ready to compete when the stakes go up. And I can see a lot of software houses — the smaller ones — going broke within the next nine months, while the large companies get bigger.

"In the long term, I think the computer industry will stay healthy, and I can see software gaining the same status as records and tapes have now. It won't be long before the home computer is as familiar as, say, the television or telephone in people's homes."

Clement Chambers should certainly be around to see if his predictions come true — after all, he's got at least another 40 years of work ahead of him.



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Value for money

***Andy Pennell** looks at the new Amstrad micro which could challenge the dominance of Sinclair, Commodore and Acorn*

As revealed exclusively in PCW January 5-11, Amstrad have launched a computer that looks as if it could beat Sinclair, among others at its own game Amstrad has for some years been producing cheap hi-fi equipment and, more recently televisions and videos Its new range of micros extends their philosophy

Amstrad was the first to package hi-fi separates together in one box and its micros use a similar idea that packages a monitor and a cassette deck along with the main unit starting at the ridiculous price of £229 There are two models at the moment, both consisting of the CPO 464 main console with inbuilt cassette unit, one supplied with a green screen monitor, for £229, and the other supplied with a colour RGB monitor, for only £329 The machine itself comes with 64K of Ram and 32K of Rom, with high-res colour graphics and sound At the heart of the machine is a Z80A processor, as used in many other machines including the Spectrum, which has the advantage over other processors in that it can run CP/M

Of the 64K Ram, 16K is dedicated to the screen display leaving around 42K available to the user just a bit more than in the Spectrum The screen has three modes — in mode 0, there are 16 colours selectable from a pallette of 27, with a resolution of 160x200, which is not bad In mode 1 four colours can be displayed at one time, again from a pallette of 27, with a resolution of 320x200, which is good Finally, mode 2 is the highest resolution with two colours available at a resolution of 640x200, which is excellent

The number of characters per line in these modes are 20, 40 and 80, respectively This latter figure is most important for business applications, and in particular CP/M

The sound on the Amstrad is very good, using the ubiquitous AY-3-8912, giving three channels The channels are mixed to give a mono output on the internal loudspeaker, via a volume control, and there is also a mini-jack socket that gives 'steno' sound output. The stereo is obtained by mixing the channels together differently, to obtain pseudo left and right sound.

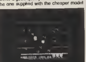
So much for the insides of the machine, what of the outside? The keyboard consists of 74 keys in all, in three groups The main group is the QWERTY section, along with a nice long space bar, and massive Enter key The keys themselves are very nice to type on and are as good as on any home micro with a proper keyboard There is also a numeric pad to the right of the main cluster and a small cluster above it consisting of the cursor keys and a Copy key for editing Personally, I would have preferred the cursor keys to be part of the main group, as they really are too far away

To the right of all the keys is the inbuilt cassette unit or 'datacorder as Amstrad like to call it which consists of a bog-standard cassette recorder with most of the audio electronics removed Although all connections are internal, so there are no external leads to worry about, the computer does not actually control the recorder The operator still has to press the relevant keys when required Thoughtfully a tape counter is included, along with a Pause button — would someone please tell me what use Pause is on a computer tape recorder?

Directly above the keys is a little coloured drawing which serves no useful purpose, other than to fill up what would otherwise be an empty space on the facia. Amstrad's hi-fis all have little graphs on their facias, presumably for a similar reason

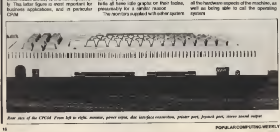
The monitors supplied with either system are a necessary part of it, as they contain the power supply for the main console The colour monitor is based on an Amstrad tv with most of the electronics removed, requiring RGB input. The picture obtained is very nice indeed, certainly better than is possible on a domestic tv, but not quite as good as the better class of monitors available separately However, the monitors that do give a better picture are more expensive than the Amstrad monitor and the computer together so many people may feel that for £329 they can get a good RGB monitor together with a 'free computer, and a good one at that!

Eighty columns can be displayed clearly in colour though for extensive work I would prefer a good quality b/w monitor such as the one supplied with the cheaper model



which gives a nice picture, with true grey-scale For those that buy the cheaper system, for about £30 a modulator is available so that it can be hooked up to the domestic colour tv with the unavoidable loss in picture quality

The Basic occupies 16K of the Rom, and was written by a company called Locomotive Software This name is particularly apt as it is one of the fastest Basics I have seen, and is based very much on Microsoft Thankfully, Amstrad has more thought for the user than companies such as Commodore, and have extended the Basic to cover all the hardware aspects of the machine, as well as being able to call the operating system



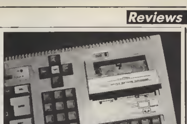
Rear rear of the CPC64 From left to right. monitor, power input, disc interface connection, printer port, joystick port, stereo sound output

Apparently, the Amstrad used the BBC micro as its model, but unfortunately the Basic does not have many of the structured features of the Beeb. However, it does have a function similar to the Beeb's *FX command, for accessing the operating system, as well as a command for using any of the sideways Roms, up to 240 of which may be fitted. The Basic gives the user windows in a fashion for printing text and graphics, but they are not up to concurrent CP/M or QL standards. There are lots of easy to use graphics commands, for both absolute and relative plotting, and colour is controlled by sensible Ink, Paper and Pen commands.

As with the Spectrum and others, streams are used for input/output and on the standard machine these are eight streams for the screen windows, one for the printer (via the parallel port), and one for the cassette unit. If a peripheral such as a serial port or disc drive is added, other streams can be defined for them.

The Amstrad's Basic also has an almost original feature — that of controlling interrupts. It has the After and Every commands that wait a defined time, then do the equivalent of a Gosub. The difference between them is that Every occurs regularly but After triggers the routine once only. The only other Basic to come near this is Basic-G, available as an extra for the CGL/Sord M5, which extends the idea further to include interrupts triggered by key presses and joystick movements.

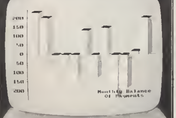
When entering Basic programs, the editor used is a cross between the much maligned Microsoft line editor, and the BBC method of using Copy to read characters from other parts of the screen, and Locomotive have used the best features of both.



Detail of numeric keypad, cursor controls and built-in cassette unit

If all goes to plan, and there seems little that could stop it, the Amstrad machines should be in the shops by June, in four selected retailers only — namely Rumbelows, Comet and Boots. Although not available quite as soon, CP/M will be available, and was demonstrated at the launch. The design is finished, but production has not been started, and the first drive and interface will be about £190, with a second drive available at £150. Instead of the more usual 5¼" drives, Amstrad have opted for the Hitachi 3" format, though in theory at least other drives could be used. The CPC 464 with b/w monitor and single drive will be a ridiculous £429, with a colour version for £529, making the Amstrad the cheapest CP/M machine to my knowledge.

Also shown at the launch was just some of the software that Amsoft, the software side of Amstrad, will be releasing. Much of it originally came out on the Spectrum, such as *Harrier Attack*, *Boogaboo the Flea*, and Hisoft's Pascal. The machine itself and its firmware has been finished for a couple of months now, so there should be none of the QL-type delays while bugs are ironed out of it. The forethought of Amsoft supplying machines to certain software houses in advance must be applauded, a feat few other companies in the market have matched.



How does it compare with the competition? Well, I think Amstrad are the first people to offer better value for money than Sinclair — for around the price of a QL you will be able to get a CPC 464, disc drive and b/w monitor in a shop, without the delay of ordering by mail order, and with CP/M you have (theoretically at least) access to practically any piece of business software, instead of waiting for everyone to create from scratch programs to run under QDOS and duplicate them on Microdrive.

I think the Amstrad will give a lot of sleepless nights to Sinclair, Acorn and Commodore, and nightmares to Memotech and Enterprise/Elan. I think it could turn out to be what the QL could and should have been — a terrific home micro with an awful lot of potential as a business machine. It's just a shame that a machine conceived and designed in Britain has, because of import duty, to be manufactured in Korea. Those, myself included, who said that QL was going to be the micro of the year could prove to be rather short-sighted.


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Bubbling over

Ian Goldeack presents a bubble sort program for the BBC

This small routine gives a visual display to help a pupil understand and remember the process involved in a bubble sort. It can run at six different speeds, and therefore can be used for a variety of purposes.

On its fastest speed, it can be used simply to sort up to 20 strings of letters, numbers, or both into order. As the sorting is based on the ASCII code of each character, numbers come before letters. For the same reason, lower case letters come after upper case.

In any of the slower modes, the program can be used as a demonstration for students. It is also useful to a beginner of any age who has a text book explaining the bubble sort, but is not sure how to interpret the pages of incomprehensible text with no examples.

As well as displaying the number of words to be sorted this program also displays the number of passes which have been made by the bubble down the screen. In a very basic version of the bubble sort, this would always finish up being the same as the number of words sorted. However, with the bubble sort it is possible to introduce several time saving features. One of these is the decrementation of the variable *X* during the main sorting routine.

Another very common technique used during this type of sort is the use of the FLAG. If during one pass of the bubble through the array, no change is made, obviously all the elements of the array are in order and therefore there is little point in continuing with the time consuming sort.

The program has been written in a way which makes it reasonably easy to convert for any micro. All the VDUs in the program are used to change the colour of the text, etc, and should not present many problems to an experienced programmer. The Tab command on the BBC is slightly more advanced than that on most micros and is in the form Tab (Horizontal co-ordinate, vertical co-ordinate).

On the BBC, the program uses *Mode 0* (the 80 character mode), and so may not be clear on some ordinary television sets.

```
10 *KEY  5LNUMBER MODE1 M IS
20 *KEY 1 RUN M
30 REM ***************************
40 REM *                         *
50 REM *   BUBBLE SORT PROGRAM   *
60 REM *                         *
70 REM *         by:             *
80 REM *                         *
90 REM *      Ian  Goldsack      *
100 REM *                        *
110 REM **************************
120 MODE 0
130 MOVE 0,1023
140 DRAW 1279,1023
150 DRAW 1279,900
160 DRAW 0,900
170 DRAW 0,1023
180 MOVE 640,1023
190 DRAW 640,900
200 PRINT TAB(2,1);'Number of words to be sorted '
210 PRINT TAB(42,1'; Number of passes made.
220 VDU 23;8202;0,0;0;
230 REM ***************
240 REM *             *
250 REM *  Input data *
260 REM *             *
270 REM ***************
280 PRINT TAB(5,8); SPEED  1-5    ?
290 LET K$=GET$:IF K$=  THEN GOTO 29
300 IF ASC(K$)>47 AND ASC(K$) 54 THEN GOTO 3 ELSE GOTO 29
310 PRINT TAB(19,8),K$
320 LET SPEED=VAL(K$)*100
330 PRINT TAB(5,10); Enter number of words to be sorted  MAX 20

340 LET NUMBER$=
350 K$=GET$:IF K$=  THEN GOTO 350
360 IF ASC(K$)=13 THEN GOTO 410
370 IF ASC(K$)>47 AND ASC(K$) 58 THEN LET NUMBER$=NUMBER$+K$ ELSE G
OTO 350
380 PRINT TAB(30,10);NUMBER$
390 SOUND 1,-15,200,1
400 GOTO 350
410 IF VAL(NUMBER$)>20 THEN PRINT TAB(5,12); NUMBER TOO LARGE :SO
UND 2,-15,100,10:FORS=1TO1000:NEXT:PRINTTAB(10,12);
:GOTO 330
420 LET NUMBER=VAL(NUMBER$)
430 PRINT TAB(35,2);NUMBER
440 DIM WD$(100)
450 FOR I=1 TO NUMBER
460   PRINT TAB(5,10);'Enter word number  I;  >

470   INPUT TAB(25,1 ;WD$(I
480   IF LEN(WD$(I)) 4 THEN GOTO 4
490   PRINT TAB(20,1 +I);WD$(I)
500   NEXT I
510 PRINT TAB(0,10);'
```

```
520 REM ***************
530 REM *             *
540 REM *  SORT DATA  *
550 REM *             *
560 REM ***************
570 LET X=NUMBER-1
580 FOR PASSES=1 TO NUMBER
590   LET FLAG=0
600   FOR I=1 TO X
610     IF WO$(I)>WO$(I+1) THEN GOSUB 720
620     NEXT I
630   LET X=X-1
640   PRINT TAB(70,2);PASSES
650   IF FLAG=0 THEN GOTO 930
660   NEXT PASSES
670 REM *******************
680 REM *                 *
690 REM * SORT SUB-ROUTINE *
700 REM *                 *
710 REM *******************
720 FOR Q=30 TO 55
730   FOR D=1 TO SPEED:NEXT
740   PRINT TAB(Q,10+I);" ";WO$(I)
750   NEXT Q
760 FOR W=0 TO LEN(WO$(I))
770   PRINT TAB(55+W,10+I);" "
780   NEXT W
790 PRINT TAB(55,11+I);WO$(I)
800 FOR W=0 TO LEN(WO$(I+1))
810   PRINT TAB(30+W,1+I1);" "
820   NEXT W
830 PRINT TAB(30,I+10);WO$(I+1)
840 FOR Q=55 TO 30 STEP-1
850   FOR D=1 TO SPEED:NEXT
860   PRINT TAB(Q,I+11);WO$(I);" ";
870     NEXT Q
880 LET X$=WO$(I)
890 LET WO$(I)=WO$(I+1)
900 LET WO$(I+1)=X$
910 LET FLAG=1
920 RETURN
930 REM END ROUTINE
940 PRINT TAB(1,25);"PRESS SPACE"
950 K$=GET$:IF K$=" "THEN RUN ELSE GOTO 950
```



ROM SP



commodore 64
mastercode assembler

Shake, rattle and roll

***Merk Lawence** presents a character ganerator which will rotate, invert, mirror and scroll*

While using the character generator on the *Horizon* tape, I thought it would be nice to have such facilities as rotate, invert, mirror and scrolling, which are available on commercial programs This would greatly speed up character generation as it is sometimes necessary to have the same character such as a pacman, defined in four directions or to have a mirrored image of a character

Instead of adding these facilities to the *Horizon* program I decided to write a complete program I also decided to write it in machine code as this would mean you would not have to wait while the character is rotated, scrolled, etc This program fits my requirements and will hopefully be useful to others

A gcod character generator is not only of use to games programmers — I used this program to develop the characters for a program I was writing which allows you to print 64 characters on a line

The character generator is 1352 bytes of machine code plus a short Basic program to load the code from tape and run it This Basic program should be typed in first and saved by entering *Save "char gen" Line 1*, then verified Now type in the hex loader and load the code to address 31000 then *Save "gen code" Code 31000, 1352* When you have verified this, by entering *Verify """Code* type *Randomize USR 0*, to clear the machine, and rewind the tape to the start Type *Load""* and start the tape

If all is well the Basic program should load auto-run load the machine code and run it This should produce a display of an 8 × 8 grid the user definable character set and a menu If it does not, type in the check program and check your code against the listing *Poking* any incorrect values

The menu should provide all the information needed to use the program, although the scrolling option may need a little explaining The keys 1 to 4 act as scrolling keys in the same way as keys 5 to 8 act as cursor keys, so 1 scrolls left 2 down 3 up and 4 right Pressing z changes mode from plot to unplot or vice versa. Plotting mode produces a flashing black/cyan cursor and unplot poroduces a flashing white/cyan cursor The cap shift key is used to return to Basic Type *Goto 20* to return.

```
LIST
  10 [illegible] 30099:LD[illegible]
  20 RANDOMIZE [illegible]

        CHAR GEN CODE

7916  3A 48 5C 32 80 5C [illegible] [illegible]
7920  32 6A 5C AF CD 97 [illegible] [illegible]
7528  60 0D 11 01 58 21 [illegible] [illegible]
7930  01 60 00 36 29 ED B0 [illegible]
7938  40 01 36 0D ED 80 01 60
7940  01 30 17 ED B0 21 26 4B
7948  11 E6 7C 06 13 CD 88 78
7950  21 A0 48 11 F9 7C CD 88
7958  78 2E C0 11 1E 7E 06 32
7960  CD 88 7B 21 00 50 11 0C
7968  7D 06 F2 CD 8B 7B CD AB
7970  78 CD D7 7B 21 63 58 1E
7970  BD 16 00 CD FE 7A 73 D5
7980  E5 CD 8E 02 7B E1 D1 FE
7988  1F 20 0E 7A 3C E8 01 57
799B  1E 8D FE 01 20 02 1E C5
7998  AF FE 04 20 0C 7D E6 1F
79A0  D6 04 38 D7 CD CC 7A 28
75A6  AF FE 13 20 0C 7D E6 1F
7980  D6 0C 30 C7 CD CC 7A 23
79B8  AF FE 08 20 13 E5 01 60
79C0  58 AF ED 42 E1 38 84 CD
79C8  CC 7A AF 01 20 00 ED 42
79D0  FE 03 20 11 E5 01 80 59
79D8  AF ED 42 E1 30 9D CD CC
79E0  7A 01 20 00 09 FE 12 CC
75E8  10 7B FE 0F CA 1E 79 FE
79F0  0D CC 3B 7A FE 22 CC 30

7A00  CA [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] 7A
7A08  FE [illegible] [illegible] [illegible] [illegible] FE 1C CC
7A10  73 [illegible] [illegible] 14 CC 58 7C FE
7A18  0C CC 99 7C FE 10 CC AC
7A20  7C FE 00 CA 70 79 FE 27
7A28  C2 7E 79 CD 60 0D 3A B0
7A30  5C C8 2F C8 2F C8 2F CB
7A38  97 22 C9 D5 E5 21 00 58
7A40  06 08 36 0B 23 10 F0 11
7A48  84 58 06 08 21 00 58 C5
7A50  06 08 4E C8 09 1A FE 3D
7A58  20 02 C8 C1 71 23 13 10
7A60  F1 21 18 00 19 E8 C1 10
7A68  E3 21 00 58 06 08 CB 0E
7A70  23 10 F8 11 00 58 CD A8
7A78  7A E1 D1 C9 CD FE 7A 2A
7A80  78 5C 22 E2 7C DD 21 D5
7A88  7C CD 70 09 18 17 11 11
7A90  00 DD 21 D5 7C AF CD 56
7A98  05 11 A8 00 DD 2A 7B 5C
7AA0  3E FF CD 56 05 C3 1E 79
7AA8  D5 E5 06 08 21 84 58 C5
7A00  06 08 1A 0E 0D CB 7F 20
7AB8  02 0E 3D 71 23 CB 07 10
7AC0  F2 01 18 00 09 13 C1 10
7AC8  E6 AF 18 2F D5 E5 7A 1E
7AD0  0D FE 01 20 25 AF 01 6D
7AD8  58 E5 ED 42 E1 38 19 7D
7AE0  E6 1F FE 03 28 12 FE 0C
7AEB  28 0E AF E5 01 6D 59 ED
7AF0  42 E1 30 04 1E 3D 18 02
7AF8  1E 0D 73 E1 D1 C9 D5 E5
7B00  11 01 00 21 2C 01 CD 85
7B08  03 06 0A 76 10 FD 18 EB
```

7B1[illegible]	[illegible]	06	09	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	79	12	[illegible]	28
7B18	00	0E	0D	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	E8	01	1C	00	09
7B20	0E	3D	71	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	24	00	09	C1	10
7B28	00	09	C1	10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	D1	C9	03	6[illegible]	72
7B30	D5	E5	CD	38	7B	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	69	63	73	20	20
7B38	7A	18	D3	CD	FE	[illegible]	[illegible]	98	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]F	00	20	4[illegible]	60
7B40	40	11	FE	7D	06	[illegible]	CD	88	[illegible]CE8	[illegible]	[illegible]	[illegible]	63	74	65	72	20
7B48	7B	21	0B	5C	35	00	7E	D6	7[illegible]	4[illegible]	65	[illegible]	65	72	61	74	6F
7B50	41	38	FB	FE	15	30	F7	26	7CF8	72	39	20	74	6F	20	38	20
[illegible]B58	00	6F	29	29	29	ED	50	7B	7D00	6D	6F	76	65	20	63	75	72
7B60	5C	19	E5	21	90	40	11	0E	7D08	73	6F	72	2E	5A	20	74	6F
7B68	7E	CD	8B	7B	E1	C9	D5	E5	7D10	20	43	68	61	6E	67	65	20
7B70	CD	38	7B	CD	24	7C	CD	AB	7D18	6D	6F	64	65	20	28	70	6C
7B78	7B	AF	E1	D1	C9	D5	E5	C5	7D20	6F	74	2F	75	6E	70	6C	6F
7B80	06	08	1A	77	13	24	10	FA	7D28	74	29	2E	20	[illegible]1	20	74	6F
7B88	C1	18	EF	C5	D5	E5	D5	E5	7D30	20	70	6C	61	63	65	20	69
7B90	1A	D6	20	6F	AF	67	29	29	7D38	6D	61	67	65	20	6F	6E	20
7B98	29	11	00	3D	19	EB	E1	CD	7D40	63	68	61	72	61	63	74	65
7BA0	7D	7B	[illegible]1	13	23	10	E7	E1	7D48	72	2E	20	20	53	20	74	6F
7BA8	D1	[illegible]1	C9	06	03	21	F0	40	7D50	20	53	61	76	65	20	63	68
7BB0	ED	5B	7B	5C	C5	06	07	[illegible]D	7D58	61	72	61	63	74	65	72	73
7BB8	7D	7B	23	23	E5	21	08	00	7D60	20	74	6F	20	74	61	70	65
7BC0	19	EB	E1	10	12	D5	11	32	7D68	2E	20	20	20	4C	20	74	6F
7BC8	00	19	D1	C1	78	FE	03	20	7D70	20	4C	6F	61	64	20	63	68
7BD0	03	21	30	42	10	DE	C9	06	7D78	61	72	61	63	74	65	72	73
7BD8	04	21	84	40	C5	11	50	7E	7D80	20	66	72	6F	6D	20	74	61
7BE0	06	08	1D	7D	7B	23	10	FA	7D88	70	65	2E	20	52	20	74	6F
7BE8	11	58	7E	CD	7D	7B	11	18	7D90	20	72	6F	74	61	[illegible]4	65	20
7BF0	00	19	C1	10	E7	06	04	21	7D98	63	6C	6F	63	6B	77	69	73
7BF8	04	48	C5	11	50	7E	06	08	7DA0	65	20	39	30	20	64	65	67
7C00	CD	7D	7B	23	10	FA	11	58	7DA8	73	2E	20	20	43	20	74	6F
7C08	7E	CD	7D	7B	11	18	00	19	7DB0	20	43	6C	65	61	72	20	61
7C10	[illegible]1	10	E7	06	08	11	FF	3C	7DB8	6E	64	20	53	74	61	72	74
7C18	21	84	48	CD	7D	7B	23	10	7DC0	20	61	67	61	69	6E	2E	20
7C20	FA	36	80	C9	C5	D5	E5	F5	7DC8	20	20	20	20	50	20	74	6F
7C28	11	84	58	06	08	[illegible]5	06	08	7D[illegible]0	20	70	69	[illegible]3	68	20	7[illegible]	70
7C30	0E	00	1A	FE	3D	20	02	CB	7DD8	20	63	68	61	72	61	63	74
7C38	F9	CB	01	13	10	F4	71	23	7DE0	6[illegible]	[illegible]2	2E	20	20	20	20	20
7C40	E5	21	1B	00	19	EB	E1	C1	7DE8	20	20	70	20	[illegible]9	20	74	6F
7C48	10	E3	F1	E1	D1	C1	C9	E5	7DF0	20	49	6E	[illegible]6	65	7[illegible]	74	20
7C50	21	00	5B	CD	24	7C	E1	C9	[illegible]F	69	6D	61	67	65	2E	5[illegible]	68
7C58	D5	E5	CD	4F	7C	21	00	58	[illegible]00	69	63	68	20	43	68	61	72
7C60	7E	E5	D1	23	01	07	00	ED	7E08	61	63	74	65	72	3F	20	20
7C68	B0	12	11	00	58	CD	A8	7A	7E10	20	20	20	20	20	20	20	20
7C70	E1	D1	C9	D5	E5	CD	4F	7C	7E18	20	20	20	20	20	20	31	20
7C78	21	87	58	7E	E5	D1	2B	01	7E20	74	6[illegible]	20	[illegible]4	20	74	6F	20
7C80	07	00	ED	B8	18	E3	D5	E5	[illegible]28	73	63	72	6F	6C	6C	20	20
7C88	CD	4F	7C	21	00	5B	E5	D1	7E30	6C	69	6D	65	20	35	20	74
[illegible]90	06	08	C8	06	23	10	FB	18	7E38	6F	20	38	29	2E	20	4D	20
[illegible]C98	D4	D5	E5	CD	4F	7C	21	00	7E40	74	6F	20	6D	69	72	72	6F
[illegible]CA0	58	E5	D1	06	08	CB	0E	23	7E48	7[illegible]	20	69	6D	61	6[illegible]	65	2E
[illegible]CA8	10	FB	18	C1	D5	E5	11	84	7E50	FF	80	80	80	80	80	80	80
[illegible]B0	58	21	80	58	06	08	[illegible]5	06	7E58	80	[illegible]	00	80	80	80	80	80

No such number

Jaaon Orbaum and Geoffrey Campbell *explain some of the intricacies of different addressing modes*



Last week we shdwed how the Dragon represents numbers in binary, and the internal organisation of the processor Obviously, this processing power is of no use unless the numbers obtained can be stored for later access and further processing

From machine code, this is achieved using the *ST* command, and, to retrieve a stored number, *LD* Both these commands must have a register and an address specified Thus, if we wanted to store the contents of the *A* register in address 2000, then we would write — *STA 2000*

Conversely, to load the *A* register with the contents of address 2000, we would write — *LDA 2000*

Now, in some cases, we might want to load a register with a number not the contents of an address To load the *A* register with 100, we would write — *LDA #100*

This is using a different addressing mode There are, altogether five different addressing modes

INHERENT — this mode does not use an address Examples are some forms of *INC DEC* and *CLR*

DIRECT — this mode uses the specified address to operate on, but can only take a short address. that is a one-byte number It is fairly limited, but is faster than *EXTENDEO*

EXTENDED — essentially the same as the *DIRECT* mode, this acts on a two-byte address, and can therefore act on any address in memory It takes more memory to store a command in *EXTENDEO* mode, but the command will be more powerful

RELATIVE — this mode is used with the branch instructions, and will be covered more fully next week.

INDEXED — this mode uses the index registers to modify the address acted on, so that it is possible to use arrays from machine code The command *LDA, X* will load the *A* register with the contents of the address pointed to by the *X* register Thus, if the *X* register contains 2000, the *A* register will now contain the contents of address 2000 The same thing can be done with the *Y* register

Also, a base address can be specified, so that *LDA 2000,X* will load the *A* register with the contents of address (2000+X)

INDIRECT — this mode takes the address to be operated on as the contents of the specified address If address *2000* held 100, the *LDA (2000)* will load the *A* register with the contents of address 100 This can be used to specify two-byte numbers as the specified address if taken as one part of a two-byte number so with address 2000 specified addresses 2000 and 2001 are used to contain the final address

If we wanted to put zero into address 2000, we could write

```
LDA #0
STA 2000
```

but this is clumsy and it would be simpler to have a command to set an address to zero The command to do this does exist and the example could be replaced by

```
CLR 2000
```

This can also be used on registers, so that *CLR A* will set the *A* register to zero Note, though that this instruction only works on a one-byte number so that to set the two-byte address at 2000 and 2001 to zero, we would have to write

```
CLR 2000
CLR 2001
```

Most of the arithmetic functions will be dealt with in a couple of weeks but two useful ones that we will use in this article are *INC* and *OEC* These mnemonics stand for increment and decrement or add one and subtract one They can have two forms

```
INCA
DECB

INC 2000
DEC 2001
```

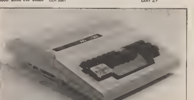
This example will add one to the contents of the *A* register subtract one from the contents of the *B* register add one to the contents of address 2000 and then subtract one from contents of address 2001 Note that the first two instructions are *INHERENT* addressing while the last two are *EXTENOED* addressing

Of a similar form are the *LEA* commands There are two of these, *LEAX* AND *LEAY* The *LEA* stands for 'Load Effective Address', and the commands are used to add to, or subtract from the *X* and *Y* registers The main use of this is to modify indexed addresses. If we wanted to add two to the *X* register, we would write

```
LEAX 2,X
```

and similarly for the *Y* register

```
LEAY 2,Y
```



Remote control

John Myerscough presents a program to turn the BBC into a time switch

For those people like myself who cannot be bothered to stay up until twenty-five past twelve twice a week to record the Basicode programs being transmitted by the BBC on Radio 4, here is a short program to turn the BBC microcomputer into a time switch

The program can also be used to remotely record any other type of audio program — from *Gardener's Question Time* to the *Archers* at any preselected time

To record programs at predetermined times the BBC micro is connected to a radio-cassette player or similar device with a motor control Only the motor control lead need be connected from the radio-cassette player to the micro If the motor control is part of a 7-pin Din plug arrangement then you will need to experiment to ensure this does not affect the recording quality

To make the micro behave like a time switch first load and run the *Programmable Timer Switch* program Then turn on the radio and set the cassette to record Once the program is run the tv can be turned off as it plays no further part in the proceedings

The computer program itself is fairly straightforward Once the program is run the time delay before the cassette recorder is activated can be varied using the F0 and F1 keys

The listings is for a 1 2 OS BBC machine, but it will run on a 0 1 OS BBC simply by changing the cursor-off command in Line 40

```
   10 REM PROGRAMMABLE TIMER SWITCH
   20 REM COPYRIGHT 84 J MYERSCOUGH
   30 MODE7
   40 VDU23;8202,0,0 0
   50 CLS
   60 PROCSETTIME
   70 PROCSETALARM
   80 REPEAT
   90   REPEAT
  100     PROCTIME
  110     PROCDISPLAYTIME(131)
  120     UNTIL HOURS=SHOURS AND MINUTES=SMINUTES AND SECONDS=SSECONDS
  130   *MOTOR1
  140   REPEATPROCTIME
  150     PROCDISPLAYTIME(129)
  160     UNTIL HOURS=FHOURS AND MINUTES=FMINUTES AND SECONDS=FSECONDS
  170   *MOTOR
  180   UNTILFALSE
  190 DEFPROCSETTIME
  200 VDU28 0 24,39,21
  210 PRINT"ENTER TIME (24 HOUR CLOCK)"
  220 INPUT"HOURS,MINUTES,SECONDS",HOURS.MINUTES.SECONDS
  230 TIME=HOURS*360000+MINUTES*6000+SECONDS*100
  240 CLS
  250 VDU26
  260 ENDPROC
  270 DEFPROCSETALARM
  280 VDU28,0,24,39,21
  290 PRINT"ENTER TURN ON TIME (24 HOUR CLOCK)'
  300 INPUT"HOURS,MINUTES,SECONDS",SHOURS,SMINUTES,SSECONDS
  310 CLS
  320 PRINT"ENTER TURN OFF TIME (24 HOUR CLOCK)"
  330 INPUT"HOURS,MINUTES,SECONDS",FHOURS,FMINUTES FSECONDS
  340 CLS
  350 VDU26
  360 PRINTTAB(5,3)"CASSETTE ON AT ";SHOURS;" ' SMINUTES," ";SSECONDS;"  "
  370 PRINTTAB 5,5)"CASSETTE OFF AT ';FHOURS;' " FMINUTES;" ";FSECONDS;"  "
  380 ENDPROC
  390 DEFPROCTIME
  400 SECONDS=(TIME DIV 100)MOD 60
  410 MINUTES=(TIME DIV 6000)MOD 60
  420 HOURS=(TIME DIV 360000)MOD 24
  430 ENDPROC
  440 DEFPROCDISPLAYTIME(COL)
  450 IFINKEY(-33) PROCSETTIME
  460 IFINKEY(-114) PROCSETALARM
  470 PRINTTAB(14 12)CHR$141,CHR$COL,HOURS," ' MINUTES,":",SECONDS;"  "
  480 PRINTTAB 14,13)CHR$141 CHR$COL,HOURS," ",MINUTES;" ',SECONDS,'  '
  490 ENDPROC
```

The other side of the tracks

***Pete Gerrard** continues his series on the Commodore disc drives*

Last week we started exploring the basic (Basic?) principles involved when setting up a random access file on disc. Now having outlined the procedures, we'll start creating such a file in earnest.

Writing a Record

First of all, we must open up a command route, using whatever disc drive device number is currently active, usually 8. We then have to specify a command channel which can be any number from 2 to 14, since these are the routes used to transfer information to and from disc and 64, and channel 15 is the route for commands to the *Rom* in the disc and messages coming back from it. We also must specify a logical file number, which can be any number from 1 to 255, and which acts as a key to other details without you having to keep typing them in.

Normally people choose the same file number as channel number, so *Open* 15,8 15 would be the syntax we want, and records can now be got at using the *Print#* command.

The Data Route

Five routes, as well as the command route, can be open at the same time, and because of the time it takes to close a file (up to a few seconds whilst the disc drive tidies everything up) it's as well to keep them all open whilst everything is going on, rather than opening and closing them all the time.

We also need to reserve a buffer to hold the information going to or coming from the disc drive, and the syntax here is *Open* file number, 8, channel "#", where the # reserves the next available buffer, and associates it with that channel. Thus if we opened channel 2 we'd use

Open 2 8 2 "#"

Copying the Data

This is done using the *Print#* command, and sending data down whatever channel we've opened into the correct buffer. Thus if our first record was

GORE BRENDON
01 437 4343

and the part to go to the buffer, as the keyword need not be part of the direct access record, was stored in the variable A$ thus

A$="BRENDON 01 437 4343"

it could be transferred to the buffer by *Print#*1 A$. However, before we can do this we need to set the block pointer to a free block, and this is done using the Block Point command or B-P. The syntax for this would be

*Print#*15,"B-P";C;P

where C is the data channel number and P is the pointer position required. So our full command would be

*Print#*15,"B-P",2;1
*Print#*2,A$

Finding a Free Block

A simple way of finding free blocks is to put the direct access files onto an otherwise empty diskette. Then, as long as you don't use track 18 sectors 0 to 2, which are reserved for the disc directory, you control completely the placing of information on the disc.

However, if there are going to be other things there, we must find out which blocks are free and reserve them for our own use. This is done using the Block Allocate command. When you use this command to tell the disc that a particular block is to be allocated and read the error channel, one of two messages will occur.

Either you'll be told OK and the block will be allocated, or you'll get error message number 65 *Bad Block* followed by two numbers which are the track and sector of the next free block down the disc.

So, if you always attempt to allocate track 1, sector 0, the first time you'll be okay, and ever after you'll be told *Bad Block* and the location of the next free track and sector. Then if we allocate that it will be reserved for our use and the disc drive won't use it when storing programs or sequential files. So, the complete syntax would look like this

*Print#*15 "B A" 0,1;0 which attempts to allocate drive 0, track 1, sector 0

*Input#*15,EN EM$ ET,ES which reads the error message from the error channel. If EN=65 EM$ will equal *Bad Block*, and we can then

*Print#*15,"B-A";0,ET,ES which allocates drive 0, track ET and sector ES the next free block

To transfer the buffer to the disc, another disc command Block Write must be used specifying the command channel, the drive number, the track and the sector, which we already know to be ET and ES. So we must

*Print#*15 "B W" 2,0 ET,ES assuming we're using command channel 2, of course.

Keeping Track of the Index

The index associates the keyword with the track and sector number of the information you put on the disc, and the ideal way to handle all this would be in an array holding the surname and the associated track and sector. Thus our entries might look like this

GORE 1 2
LAKE 1 1
KELLY 1 0

The track and sector can then be read off using the *Val* and *Str$* commands to go from string data to numeric data and back again.

As the index grows, searching through it becomes a tedious process, so it would be a wise idea to keep it all in alphabetical order and then use a binary search to get to the specified item quickly.

This involves guessing at the middle location in the array and then (if there were 100 elements in it) guessing at 75 if your guess is too low or 25 if it's too high; do you see why it should be alphabetical now? So that the computer can alphabetically compare the name it finds there with the name that it's after and branch accordingly.

Thus when we do track the name down we can get the track and sector numbers and read the data back again, using the U1 command which requires the channel number, drive number, the track and the sector.

This command transfers the contents of a specified track and sector into the associated channel buffer, and a simple *Input#* down that channel will transfer the information into Basic. Like this (assuming channel 2)

*Print#*15 "U1";2;0,T,S which will transfer the information from track T sector S into the buffer associated with channel 2.

*Input#*2 A$ which will put the contents of the buffer into the variable A$.

A couple of things to watch for. Try to keep your records less than 80 characters long, as Basic *Input#* can normally only handle 80 character chunks at a time. Any more than that and the machine usually hangs up!

Don't put blank strings as part of the disc information, convert them into shifted spaces or something. Validating discs will cause all kinds of chaos, and if you have done that you'll have to re-create everything from your key index array. As you can see, relative records are not the easiest things in the world to write, but at least the last two weeks should have pointed you in the right direction!


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As the last remaining soldier of an army of ants crushed by a group of scorpions, your sole purpose in life is to rescue the Queen Ant taken hostage only moments ago. Fast action machine code game that calls for a winning combination of sharp wits plus extra fast reflexes.
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Open Forum

Open Forum is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the *Program of the Week* double our new fee of £$ for each program published.

Reactimer

on Spectrum

Have you ever wondered how fast your reaction time was, but couldn t find an easy way to calculate it?

My program will work out your reaction time quickly and easily, all you have to do is to press a key

It works it out by using the Spectrum's internal clock. It takes two readings from the internal clock, one at the start and one when a key is pressed Then the reaction time of the computer operator is found by taking away the 1st reading from the 2nd reading

On average you will find it to be about 0 3 of a second A good one is less than 0 2 my best is 0 22 of a second

Program notes

10	Variables
11	Colours
100-120	Time to wait
140	Starting time
145	Stop cheating
170	Final time
200-250	Time printed
2000-2040	Quickest time
8000-8100	Title
8110	Funny effect

```
  10 LET s=9999  LET a$="JOHN KE
RR"
  11 INK 7  PAPER 0  BORDER 0. B
RIGHT 1  CLS   GO SUB 8000
 100 RANDOMIZE
 110 LET x=RND*200+350
 120 PRINT AT 0,0,"Quickest time
",s," seconds",AT 1,0,"Held by
",a$  FOR f=0 TO x  NEXT f
 140 LET time0=PEEK 23672+256*PE
EK 23673
 145 IF INKEY$<>"" THEN GO TO 14
5
 148 BORDER 3
 160 PRINT AT 10,10, FLASH 1,"PR
ESS ANY KEY"
 168 IF INKEY$="" THEN GO TO 168
 170 LET time1=PEEK 23672+256*PE
EK 23673
 180 LET time=time1-time0
 190 IF time<0 THEN LET time=tim
e+65536
 195 LET time=time/50
 200 BORDER 0  PRINT AT 10,2,"Yo
ur reaction time is -",AT 11,0,t
ime," seconds"
 210 IF time<s THEN GO SUB 2000
 240 PRINT AT 15,0,"If you have
a printer attached  then a certi
ficate will be made."
 250 LPRINT   LPRINT   LPRINT "
This to certify that the bearer
of this printed certificate   h
as a reaction time of -"  LPRINT
"    ",time," seconds" . FOR x=
0 TO 4  LPRINT   NEXT x
 260 PRINT AT 21,0,"Press any ke
y to start again
 265 BEEP 1,5,0
 270 PAUSE 0
 280 GO TO 11
2000 BEEP 1,4  BEEP .5,29  BEEP
.75,35
2010 PRINT AT 3,0,"Well done, yo
u have beaten the previous quic
kest of ",s," sec , "held by ",a
$
2020 INPUT  Please type in your
name      ,a$
2030 LET s=time
2040 RETURN
8000 PRINT AT 0,6,"REACTION-TIME
R",AT 0,5, OVER 1,"
  ",AT 1,20,"© John Kerr
8010 PRINT AT 3,3,"This program
will work out
8020 PRINT AT 5,0,"how good your
 reactions are,
8030 PRINT AT 7,0,"The computer
will wait for a
8040 PRINT AT 9,0,"random time b
efore it starts.
8050 PRINT AT 11,0, A message wi
ll be printed on
8060 PRINT AT 13,0, the screen f
or you to press"
8070 PRINT AT 15,0, a key , and
from this your
8080 PRINT AT 17,0,"Reaction Tim
e will be worked
8090 PRINT AT 19,0,"out."
8100 PRINT AT 21,3,"Press "SPACE
" to start
8110 RANDOMIZE USR 1304
8120 CLS
8130 RETURN
9990 STOP
9997 SAVE "REACTIMER" LINE 1
9998 STOP
9999 VERIFY "REACTIMER"
```

Reactimer
by John Kerr

3D Graphics

on Vic 20

This short program creates a three dimensional sine wave using the super expander cartridge It is surprisingly impressive for so few lines

```
10 REM 3D GRAPHICS BY T.WATSON
20 GRAPHIC 2
30 COLOR 0,0,1,1
40 CHAR 0,4,"3D GRAPHICS"
50 REGION 2
60 FOR X=0 TO 330 STEP 15
70 Y=SIN ((X)/50)*80
80 CIRCLE 2,512,Y+550,X,X
90 NEXT X
100 REGION 1
110 CHAR 15,4,"PRESS ANY KEY"
120 GETA$:IFA$=""THEN120
130 GRAPHIC 0:COLOR 1,3,6,6
READY.
```

3D Graphics
by T Watson

Open Forum

Fruit Machine

on ZX81

This programme is a simulation of an arcade fruit machine When run, the screen shows how much money you have and asks if you want another go On entering a Y the screen shows the reels, the winning combinations and some other information Each time you have another go 20p or £.2 will be subtracted from your score. At random intervals, a hold will be awarded and the reels can be held by typing the reel Nos When you have held the ones you want, type Q and the game will automatically continue This program will fit into 4K of memory

```
FRUIT MACHINE
   1 LET M=1
   2 LET A1=110
   3 LET B1=110
   4 LET C1=110
  10 LET I=0
  31 PRINT AT 7,I;"████████████
"
  60 PAUSE 100
  61 CLS
  69 GOSUB 5000
  70 PRINT AT 0,1;"YOU HAVE £",M
;" LEFT"
  71 IF M<.2 THEN PRINT "YOU HAV
E GONE BUST"
  72 IF M<.2 THEN STOP
  80 PRINT AT 10,0,"DO YOU WANT
ANOTHER GO"
  81 PRINT AT 15,20,"?"
  90 INPUT B$
 100 IF B$="N" THEN GOTO 1000
 101 LET M=M-.2
 102 LET V=30
 111 PRINT AT 3,1;"WINNERS:-"
 116 PRINT "0 - - =20"
 120 PRINT "0 0 - =40"
 130 PRINT "0 0 0 =60"
 140 PRINT "V V - =20"
 150 PRINT "* * * =900"
 155 LET R=INT (RND*6)
 156 IF RND<.3 THEN GOSUB 500
 157 GOSUB 9000
 160 LET A$="*OOVVAR*OV*AOOV*OAA
/OO*"
 161 FOR I=1 TO R+20
 162 LET B=INT (RND*20)+1
 163 LET C=INT (RND*22)+1
 164 LET A=INT (RND*22)+1
 165 PRINT AT 10,9;"█████"
 166 PRINT AT 11,7;"█ █ █ █--"
 167 PRINT AT 12,9;"█████"
 168 PRINT AT 16,20," "
 169 GOSUB 2000
 170 PRINT AT 11,10,CHR$ (CODE A
$(A)),AT 11,10,CHR$ (CODE A$(B))
,AT 11,14;CHR$ (CODE A$(C))
 180 NEXT I
 190 IF CODE (A$(A))=52 OR (CODE
 (A$(A))=60 AND CODE (A$(B))=59)
 THEN LET V=2
 200 IF CODE (A$(A))=52 AND CODE
 (A$(B))=52 THEN LET V=4
 205 IF CODE (A$(A))=23 AND CODE
 (A$(B))=23 AND CODE (A$(C))=23
THEN LET V=20
 210 IF CODE (A$(A))=52 AND CODE
 (A$(B))=52 AND CODE (A$(C))=52
THEN LET V=6
 211 IF V>20 THEN GOTO 270
 220 LET M=M+(V/10)
 250 PRINT AT 17,0," YOU HAVE W
ON £",V/10;" WHICH MEANS YOU HAV
E £",M;" LEFT
                        "
 251 PAUSE 300
 260 PRINT AT 17,3;"
                        "
 270 PRINT AT 0,1;"YOU HAVE £";M
;" LEFT
 280 PRINT AT 13,10," ";AT 13,12
;" ",AT 13,14," "
 290 LET A1=110
 300 LET B1=110
 310 LET C1=110
 320 PRINT AT 16,0;"

                        "
 330 GOTO 60
 500 PRINT AT 17,4,"YOU HAVE A H
OLD JUST TYPE THE REEL NO. AND W
HEN NO MORE TYPE ""Q"" ";
 510 LET D$=INKEY$
 520 IF D$="Q" THEN LET B$="Q"
 521 IF D$="Q" THEN LET C$="Q"
 525 IF D$="Q" THEN GOTO 630
 530 IF D$="" THEN GOTO 510
 535 PRINT D$," ";
 540 IF VAL (D$)>3 OR VAL (D$)<1
THEN GOTO 510
 550 LET B$=INKEY$
 560 IF B$="Q" THEN LET C$="Q"
 561 IF B$="Q" THEN GOTO 630
 570 IF B$="" THEN GOTO 550
 575 PRINT B$;" ";
 580 IF VAL (B$)>3 OR VAL (B$)<1
THEN GOTO 550
 590 LET C$=INKEY$
 600 IF C$="Q" THEN GOTO 630
 610 IF C$="" THEN GOTO 590
 615 PRINT C$
 620 IF VAL (C$)>3 OR VAL (C$)<1
THEN GOTO 590
 630 IF B$="Q" THEN LET B$="Q"
 631 IF D$="Q" THEN LET D$="Q"
 632 IF C$="Q" THEN LET C$="Q"
 635 IF D$="1" OR B$="1" OR C$="
1" THEN PRINT AT 13,10;"█"
 640 IF D$="2" OR B$="2" OR C$="
2" THEN PRINT AT 13,12;"█"
 650 IF D$="3" OR B$="3" OR C$="
3" THEN PRINT AT 13,14;"█"
 660 IF D$="1" OR B$="1" OR C$="
1" THEN LET A1=A
 670 IF D$="2" OR B$="2" OR C$="
2" THEN LET B1=B
 680 IF D$="3" OR B$="3" OR C$="
3" THEN LET C1=C
 690 RETURN
1000 PRINT "OK,BYE FOR NOW"
2000 IF A1<100 THEN LET A=A1
2010 IF B1<100 THEN LET B=B1
2020 IF C1<100 THEN LET C=C1
2030 RETURN
5000 PRINT AT 5,10;"RANDOM HOLDS
"
5010 PRINT AT 6,15;"EVEN AFTER A
 WIN"
5020 RETURN
```

Fruit Machine
by E Smith

Chemistry

on Oric

This program should work on any Oric. It is a Chemistry symbol tester. It asks what the symbol of an element is and you answer. I have used *Chrs* to turn off *Caps* and so the answer will have to be shifted on the first letter — you get four chances

Variables

CN	Number of tries
C$	Name of Element
P$	Symbol of Element
J	Number of elements and symbols
RN	Random choice
AN$	Answer
R	Checks element is not the same as one before

Program notes

100–120	Rem Statements
130	Clear Screen and turn off Caps
140–170	Reads Data (Elements and symbols)
180–210	Choose Element
220–240	Print Element
250	Correct Answer
280–300	Try again
310	Leaves line
320	Wrong then tells answer
321	Different Element
360–650	Data

```
100 REM
110 REM ** CHEMISTRY SYMBOLS **
115 REM **    PAUL DAVIS     **
120 REM
130 CLS:PRINT CHR$(20)
140 DIM C$(31),P$(31)
150 FOR J=1 TO 31
160 READ C$(J),P$(J)
170 NEXT J
180 CN=0.WAIT 100:CLS'PRINT'PRINT
190 RN=INT(RND(1)*31)+1
200 IF RN=R THEN 190
210 R=RN
220 PRINT
230 PRINT "What is the symbol of
    ';C$ (R):PRINT
240 INPUT AN$:PRINT
250 IF AN$=P$(R) THEN PRINT
    "CORRECT !" PING'GOTO 180
260 CN=CN+1
270 IF CN=4 THEN 310
280 PRINT 'TRY AGAIN ":SHOOT
290 PRINT
300 GOTO 240
310 PRINT
320 EXPLODE:PRINT 'The symbol of
    ';C$(R) ,  is ',P$(R),'.'
321 WAIT 100.GOTO 180
330 PRINT
350 DATA BROMINE,Br
360 DATA CALCIUM,Ca
370 DATA CARBON,C
380 DATA CHLORINE,Cl
390 DATA CHROMIUM,Cr
400 DATA COBALT,Co
410 DATA COPPER,Cu
420 DATA FLUORINE,F
430 DATA GOLD,Au
440 DATA HELIUM,He
450 DATA HYDROGEN,H
460 DATA IODINE,I
470 DATA IRON,Fe
480 DATA LEAD,Pb
490 DATA MAGNESIUM,Mg
500 DATA MANGANESE,Mn
510 DATA MERCURY,Hg
520 DATA NEON,Ne
530 DATA NICKEL,Ni
540 DATA NITROGEN,N
550 DATA OXYGEN,O
560 DATA PHOSPHORUS,P
570 DATA POTASSIUM,K
580 DATA SILICON,Si
590 DATA SILVER,Ag
600 DATA SODIUM,Na
610 DATA SULPHUR,S
620 DATA TIN,Sn
630 DATA URANIUM,U
640 DATA ZINC,Zn
650 DATA ARGON,Ar
```

Chemistry
by Paul Davies

Open Forum

Spiral

on BBC

This program uses the properties of increasing radii shapes, to draw spiral shapes and patterns Use any numbers for the inputs Try experimenting with different values as many different effects can be obtained

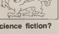
Also try changing line 130 *Draw* X,Y to 130 *Plot* 66,X,Y

```
10 REM SFIRA BY PHILIF VENABLES
20ON ERROR RUN
30MODE4
40VDU29,640;512;
50CLS:INPUTTAB(5,6)"TYPE IN THE
    STEP VALUE (THE LOWER  THE
    VALUE THE MORE SIDE UP
    TO CIRCLES)",ST
60CLS:INFUTTAB(5,6)"TYPE IN THE
    SPIRAL SIZE i.eTHE DISTANCE
    BETWEEN EACH LINE ",ST1
 70MOVE0,0
 80CLS
 90RD=1
100REPEATD=D+ST
110X=SIN(D)*RD
120Y=COS(D)*RD
130DRAWX,Y
140RD=RD+ST1
150UNTILFALSE
>*FXL.
```

Spiral
by Philip Venables

Microradio

GW6JJN



Science fiction?

This week brings news of a breakthrough in microchip technology that makes science fact seem even more like science fiction Many radio amateurs will be familiar with certain transistors known as *GaAsFETs* These transistors have been developed mainly because of radio's demands for components combining high gain with extremely low noise characteristics Radio enthusiasts like myself, who are interested in using the VHF and UHF sectors of the radio spectrum combined worldwide communication have looked to *GaAsFETs*, with their ability to amplify the tiniest most distant signals to extend out horizons

The secret of *GaAsFETs* is the semiconductor Gallium Arsenide This material is superior to silicon in that it allows the passage of electrons at about six times the speed that they can travel in conventional microchips What all this means in simple terms is that if we could replace silicon in our current computer chips with Gallium Arsenade (GaAs) then our microprocessors and memory etc would operate that much faster The big problem has been the seemingly insurmountable difficulty growing GaAs crystals that are sufficiently pure in significant quantities

Well, the news is that the Toshibe Corporation of Japan have overcome the problems At a recent International Solid State Conference in San Francisco, Toshiba presented a paper describing their new, large scale integration gate array based on the semiconductor Gallium Arsenide They have produced chips with over 1050 basic gates or 5000 transistors on a piece of GaAs 3 75mm × 3 75mm The propogation time is the world's fastest at 210 picoseconds — a record. Suffice for me to say that a picosecond is a millionth of a millionth of a second The mind boggles

As if this wasn't enough Toshibe calmly went on to announce their reactive ion etching' system. One of the gret problems with microchips of any sort is etching the tiny circuits involved Toshiba's new system incorporates some thing called a Platinum Buried Gate process and has halved the size of the already incredibly tiny transistors that make up these chips They have reduced them from two millionths of a metre to one millionth of a metre

These two achievements together lead to a speed and integration never before achieved Next time you look at a transistor, think of Toshiba who have now made them invisible to the naked eye

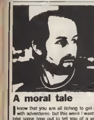
Ray Barry GW6 JJN

[illegible]


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Tony Bridge's Adventure Corner



A moral tale

I know that you are all itching to get on with adventures, but this week I want to take some time out to tell you of a very strange experience I've just had — and no it wasn't walking past a pub!

To set the scene. A software shop in London's West End on a rainy Wednesday afternoon.

Dramatis Personae:
Tony Bridge, an occasional scribbler, specialising in popular computer software
Mr Smooth, a shop assistant

Bridge enters the premises. Two reasons for this — the first and foremost, to escape the pouring rain. The second, to check out new adventures and other light relief.

Mr Smooth: Yes, sir?
Bridge: Er — pardon?
Mr Smooth: May I help you sir?
Bridge: No, thanks, just looking.

Suddenly, his eyes light up! What's this, in the Apple section? Not an adventure, but the fabled Sublogic Flight Simulator II, rumoured to be the best available for computers of less than two million dollars. This is a snip at — gulp! — £41.50. Still, hang the expense, the program is perfection personified.

Bridge (holding up the package and looking toward the cash desk): Excuse me, do you have this for the Atari?

Receiving a negative answer, Bridge replaces the box from where he plucked it.

Mr Smooth (snarling): Put that back where you found it!

He snatches it from the hands of the astonished Bridge, and places it in a completely different position on the shelf.

Bridge (aghast): But — but — I found it up here (attempts to put it back where he found it).
Mr Smooth: I said, put it back where you found it!
Bridge: But — er —
Mr Smooth: Leave it alone!

Collapse of Bridge, who exits into the rain of London's West End, leaving behind a shop assistant who can put another feather in his cap, labelled "Who do these customers think they are?"

This program was just about the most expensive non-business package in the shop and I was quite prepared to buy it. So why was I made to feel like a common thief?

What is it about us computer-users that invites such cavalier treatment? The shopkeepers and assistants are there to serve us, and they should look after the 14-year old trying to decide which version of Galaxian to purchase with his hard-saved £5 as much as the businessman spending 15,000 tax-deductible pounds on an accounting package for his VAT.

While I'm on my soapbox, I've just noticed that, finally, an Atari program had reached the top three in the software charts. Atari games have never before reached such dizzy heights, even though any Atari game can wipe the floor with any of the opposition. Trouble is, of course, they're so darned expensive! It is, surely, no coincidence that the one I'm talking about, *Batty Builders* from English Software, is priced at under £10. Take note, Atari — when are you going to price your software for the real world?

Back to the world of adventuring!

Thanks for your letter, Mrs M Roberts — to *PCW's* Editor, I know, but the sentiments you expressed are of great interest to this column and its readership.

Back in the second or third Corner I made some comments about an ill-advised adventure for the ZX81. This was *Love*, from Remsoft of Brighton. At the time although I didn't much care for the program I did wonder if I was being rather po-faced in complaining about it. The game relied on the player, who took on the persona of a poor, defenceless female, having to strip or undress to progress at certain points in the adventure. But more and more women have written to me over the intervening months, in support of my criticism, and now we have, in the magazine, writers like Jane Stoneham drawing our attention to the attitude of most software producers towards women. As she says, every one should try playing *Ant Attack*, from Quicksilva. Yes, it is a good game in itself, but it allows the player to take the role of either the male or the female protagonist, the female being cast in the traditional submissive mould, seeking help from the dominant male character. Any male player taking the female's part would gain a certain idea of just how annoying and patronising this traditional role can be to a woman.

It is for this reason that I didn't much care for Remsoft's *Love* nor more recent programs, like *Gwendoline* from the States.

It's noticeable that while a majority of the letters from males mention their Hi-Score in an arcade game, I have not had one "Score Sheet" from a woman. It seems to me that women grow out of zap-games very quickly — although my own daughters certainly enjoy a quick game of *Frogger* or *Pole Position* on the family Atari, they are quite happy to immerse themselves in *Snowball* or *Knight's Quest*, and this is borne out by the letters I receive. Women certainly appear to have a tenacity when it comes to adventures, and they only write to me for help when they are absolutely desperate.

This series of articles is designed for novice and experienced Adventurers alike. Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter. So if you have an Adventure you want reviewed, or if you are stuck in an Adventure and cannot progress any further write to Tony Bridge, Adventure Corner, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD.

50 BOOKS TO BE WON!

Enter our competition by answering the questions below and win a copy of *A Guide to Playing The Hobbit*, by David Elkan published by Melbourne House. When you have answered the questions, fill in the coupon and send it together with next week's coupon to *PCW*, 12-13 Little Newport St., London WC2 3LD by 10 May 1984. The first 50 correct entries will receive a copy of the book.

1. What is Durin's Day?
2. What is Thorin's last name?
3. Where does Elrond live?
4. What is Gollum's birthday present?
5. What is the answer to this riddle: 'A box without hinges, key or lid, Yet golden treasure inside is hid'
6. Where does Gandalf's cousin, Radagast live?
7. Why did Bilbo name his sword Sting?
8. What is the name of Thorin's father?
9. What is the necklace of Girion, Lord of Dale, made from?
10. What was laid on Thorin's tomb?

RULES
1) Each entry must consist of two coupons.
2) Answers must be on a separate sheet of paper.
3) No correspondence will be entered into.
4) All entries must be received by the closing date, May 10 1984.

Hobbit Competition (1)

Name ....

Address ....

....

....



BROKEN CARTRIDGE

Melvyn Sturce of Gorleston, Great Yarmouth writes

Q I have a TRS 80 colour computer which I think is great, but not many people over here seem to know the machine. Are you going to publish any material for it? Also can cartridges be broken if connected when the computer is switched on? I did this with an old *Dino Wars* cartridge and now it does not work

A We would probably publish some material if we were sent it The TRS 80 is like the Dragon in that it uses not only the 6809 but also passes control straight to the cartridge Indeed I recently dealt with this problem on the Dragon It is very likely that your action has caused damage to the cartridge because when anything is switched on there are short, but potentially lethal (to the ICs) power surges

IS IT SAFE TO USE?

Eric Good of Cherwell Avenue Woodstock Oxford writes

Q I am thinking of buying a Dragon home computer (64) but I would like to know if it is safe to use it on an old black and white (625) line television. Another question about televisions comes from *Paul Hendry of Boundry Park Road, Manchester who writes* Is sitting in front of a television that I use for my computer dangerous? A friend of mine at school said that a television when used with a computer gives out small amounts of radiation that can be bad if used for too long?

A Any 625 line television should work with your home computer, and no damage is done whether it is black or white, or colour Indeed problems are more likely to arise with colour televisions as they need for more control and balancing in terms of display There are plenty of Spectrum owners who can testify to this.

As for the second question, minute amounts of X-rays are emitted through the front of cathode ray tubes, which are, after all beams of fast moving electrons Evidence of this is still hazy and based mainly on older types of VDUs, which have now been improved If you sat within a few inches of your television screen for several hours a day for several years then you might start to do yourself harm Whether the TV is used for computing or not is irrelevant

PONDEROUS BASIC

N G Harvey of Robina Drive, Cheadle Stoke on Trent, Staffordshire, writes

Q After several months of frustration with a 1K ZX81 I obtained a Commodore 64 I am delighted with this machine but a little disappointed with the ponderous *Basic*

Is there any way that I can access the *Ram* of the 64 to the Z80 chip to my ZX81, ie, can I interface the two computers with a standard or made-up interface, or will I have to pay someone to delve into the innards of my ZX81. Also, if the above is possible, would I lose the superior sound, graphics, sprites, and so forth?

A There are a few unclear points in what you sy Where you say *Ram* I think you mean *Rom*

A point that needs to be made is the difference between the *Cpu* and the *Rom* (In fact *Rom* itself is only a particular type of storage but is taken to mean the language and the operating system, which is how I shall use it here)

A 6502 is a 6502, regardless of whether it is used in an Apple, Commodore, BBC or whatever The same is true of the Z80 What is different from computer to computer is the *Rom* that uses the CPU In the same way that three identical cars in the hands of three different drivers will soon handle differently In computer systems most of each computers uniqueness comes from the *Rom* The *Rom* of the CBM 64 is in 6502 machine code, this would have to be translated into Z80 machine code if it was to be usable on the ZX81 Unfortunately you are trying to merge the excellent Sinclair Basic with the good bits of the CBM 64 Thus a straightforward translation is not sufficent. (Neither is it easy) A single instruction to the CPU which you might want translated to Z80 in one context, might need to remain the same in another At the most fundamental level you are trying to merge two *Roms* used by two different Central Processing Units

ASSEMBLY LANGUAGE

Oliver Cobb of Hadlow Down Road, Crobourough, Sussex writes

Q For Christmas I received the Picturesque *Editor/Assembler* Unfortunately I do not know any thing about assembly language I have looked for a book on the subject, but I have not found one. Could you tell me if there is one and if so what, and what is the price?

A The *Editor/Assembler* is only a way of making machine code easier to use There are two books that might help you if you want to start learning machine code Melbourne House do a book called *Spectrum Machine Code For The Absolute Beginner* by William Tang Or there is *Spectrum Machine Code Made Easy* volumes one and two, by James Walsh, and Paul Holmes published by Interface Either would be a good way to start to learn machine code

CRYPTIC MANUAL

J E Price of Woodlands Close St Albans Herts writes

Q The Sinclair manual is fairly cryptic about the possibilities of adding Strings together, and almost nothing on about the use of *Screens* command, to examine what character is displayed at a given screen location. Nevertheless it seems logical that the following program should produce the results

abc abc abc

Can you explain why it does not?

```
10 CLS PRINT "abc"
20 LET m$ =""
30 FOR x=0 TO 2 STEP 1
40 LET m$=M$= SCREEN$ (0,x)
50 NEXT x
60 PRINT m$
```

A You do not need to look any further than your program, as this contains the answer in line 40 *Screens* like *Strs* is a read only command There is no place in the Spectrum's memory map that is reserved and labelled *Screens* It cannot be stored and cannot be operated on Because of the way the *Rom* is written, any attempt to operate on it will result in the String holding the value twice

Further any new values will always overwrite any existing values There are probably some interesting quirks somewhere within the *Screens* command but this does not help you What you need to do is assign a second variable the value of *Screens* and then carry out any new operations with this So your line 40 will be something like

40 *Let* n$= *Screens* (0,x) *Let* m$=m$ + n$

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Ian Beardsmore and every week he will *Poke* back as many answers as he can The address is *Peek & Poke, PCW*, 12-13 Little Newport Street, London WC2R 3LD.

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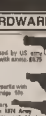
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Problem *How to enter the Dark Corner? And are you meant to do anything with the guard once you have killed him?*
Name. *Martin Reid*
Address *237 Bredhurst Road Wigmore Gillingham, Kent, ME8 0RD*

Micro: *Vic 20*
Adventure *Voodoo Castle*
Problem: *How do I get through the crack in the wall and how do I open the safe?*
Name *J Wilson*
Address: *8 Claverdale Road, Upper Tulse Hill, London SW2 2DP*

Micro: *Spectrum 48K RAM*
Adventure *Atic Atac*
Problem *Trying to find the rest of the gold key in the castle*
Name *Wayne Clay*
Address *62 Barberry Avenue, Dovis Estate Chatham, Kent*

Micro: *Vic 20*
Adventure *The Count*
Problem *What do you do when you get in the Crypt Also how do you get through the vents*
Name *Kate Buckingham*
Address. *144 Elmwood Road Barnton Northwich, Cheshire CW84NN*

COMPUTER SWAP

Computer Swap entries are limited to 30 words Either fill in the accompanying form and send to Computer Swap *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD or telephone 01-437 4343

All software offered through computer swap must be in original condition and for private sale only

Warning: It is illegal to advertise pirated software

COMPUTER SWAP

Please write your copy in capital letters on the lines below

Name

Address

Telephone.

New Releases

LIBERAL?

More DK'Tronics software in dribs and drabs but *ZigZag* is one of its most impressive releases for ages

The game is a very sophisticated version of all those 3D maze games where you grope your way through endless passages looking for things and running away from baddies

ZigZag is true to this form but cleverly done with sprites and perspectives and all the



other techiques now mandatory on any self-respecting Spectrum game

Aim of the game is to patrol various sectors hunting down the Scarabaqs — funny little creatures looking like they've stepped out of *Yellow Submarine* Using the layout of the maze intelligently these must be cornered and interrotated — a blast of the old plasma soon looses their furry little tongues Once a Scarabaq cracks you get the digit of a code which, once completed, will allow you to reach the next level

As a sop to liberal consciences you are given the option of whether to blast the little beast into a thousand particles or let him free to scurry away another day — worryingly, the temptation to blast is strong

It's not all one sided, of course there are some much nastier nasties that will sap your energy — needed for movement and blasting

Program *ZigZag*
Price *£6 95*
Micro *Spectrum*
Supplier *DK Tronics, Shire Hall, Industrial Estate, Saffron Walden, Essex CB11 3AQ*

FAMILY TREE

Genealogy is a subject that involves months of painstaking work, not only tring to prove your family are of royal blood, but also actually constructing the vast chart of all your discoveries

In the latter area the computer can now help *Genealogy* from Bel Tech is an elaborate database/cataloging system that enables you to input the details of your family tree and see them displayed in the classic form ie, with branches and lines indicating the various links between all the different parts of your family

Using a range of menu options you can 'interrogate' the database to explore particular areas of interest, like marriages in the female line etc You can print out the results to impress your friends

Program *Genealogy*
Price *£12 50*
Micro *Spectrum/CBM 64 BBC*
Supplier *Bel Tech, Stanmore Industrial Estate, Bridgenorth, Shropshire WV15 5HP*

LOADED

The Duckworth *Editor/Assembler* is a utility program designed to facilitate machine code programming on the Commodore 64

In the past, these packages have been expensive — partly because they are usually derived from the very different, and more expensive market for the Pet — Commodore's business machine However, there are now a couple of packages available for under £20 which have all the main features of the more expensive packages

Briefly, the *Editor/Assembler* enables you to write your machine code in the slightly easier to understand language of assembly — mnemonics describing what's been loaded in which register, etc

The booklet with the program is brief and not I think suitable for the beginner Machine code programmers should find it useful though

Program *Editor/Assembler*
Price *£18 50*
Micro *Commodore 64*
Supplier *Duckworth/Bug Software, The Old Piano Factory, 43 Gloucester Crescent, London NW1 7DS*

SELECTIVE

Penguin's new range of study software is designed to provide basic text revision of Shakespeare's plays At the moment programs are available for *Henry IV Part I*, *Julius Caesar*, *Macbeth*, *Merchant of Venice* *Romeo and Juliet*, and *Twelfth Night*

What the programs do is enable you to search the text of the play for particular references to a given person or theme

In a way it works rather like a conventional database — you tell it to 'search' the text for, say text references featuring Lady Macbeth and Blood and it produces all the examples it can find More than that, it refers you to other interlocking themes and explains each reference

For people taking 'O' levels these programs could be genuinely useful — something I've not been able to say about many other pieces of educational software I've seen

Obviously the program does not look through the te[illegible] it would be impossible to fit it into 48K rather it has a selective and carefully prepared store of references and correspondences created by a particular person (or group of people) Thus you can't investigate say, Lady Macbeth and sexual repression, because it isn't one of the given topics Treat it with some suspicion then

Program *Macbeth*
Price *£5 95*
Micro *Spectrum 48K*
Supplier *Penguin Books, Bath Road, Harmondsworth, Middlesex UB7 0DA*

Pick of the week

PROFIT-MAKING

Before *Millionaire* from Incentive software no-one had exploited the one obvious subject for a simulation/strategy game — running a software house

Millionaire is about just that and, more to the point, does it with some style and professionalism Like most simulations the idea is to make money by taking the right decisions for your business Unlike many simulations however you really will have to consider carefully what to do, how much to spend, etc

Aside from being very complex, the game has many other good points an automatically rescaling graph is drawn to show you how sales are going the character sets have been redesigned to add variety and interest



As a point of interest (or rather lack of it) I went bankrupt after two years of profits — more than can be said for a good many real software houses

Program *Millionaire*
Price *£5 50*
Micro *Spectrum 48K*
Supplier *Incentive Software, 54 London Street, Reading RG1 4SQ*

BIZARRE

Pigs In Space used to be the dramatic cry that preceded one of the funnier sketches in the *Muppet Show* before it went cute It is also the title of a fairly bizarre new game from Ace



It seems these intergalactic space wolves are dropping threateningly out of their intergalactic wolf spaceship Their objective, we can know in advance, is not friendly You have to prevent the wolves from reaching the ground by shooting at them from a basket which is raised and lowered by some pigs

The wolves can defend themselves from this attack, by throwing rocks at you and running towards your basket The game is totally ludicrous and even addictive in a strange sort of way No programming marvels here though

Program	*Pigs in Space*
Price	*£6 90*
Micro	*Commodore 64*
Supplier	*Ace* *82/64 Peckham Rye* *London* *SE15 4HB*

SQUARED GRID

Timebomb is the latest arcade game from CDS Microsystems whose recent releases have been language programs

The game is one that has been seen before in various guises including quite a good version printed in this magazine It involves moving a boot across a grid of squares to get to a bomb before it explodes

As a square is touched it can no longer be used so the game becomes consequently more and more difficult Grid lines can be moved left or right in an attempt to form usable paths to each new bomb It is definitely a game of skill and tactics rather than a test of reflexes, despite the urgency provided by a clock ticking away the seconds before you are blasted to Kingdom Come

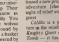
Not a difficult game to program but good fun nevertheless

Program	*Timebomb*
Price	*£5 95*
Micro	*Spectrum*
Supplier	*CDS Micro Systems Systems* *10 Westhill Close* *Tickhill* *Doncaster* *DN11 9LA*

SPLIT SCREEN

Phippe Associates have released a new program — it's an adventure (cheers, whistles, sighs of relief etc) and it looks great

Colditz is a graphic adventure in the reliable tradition of *Knight's Quest* and *Pharoah's Tomb* — it has pleasing split screen colour pictures and a large number of locations



Phippe have thoughtfully provided me (knowing, probably, how hopeless I am with adventures) with a map annotated with what objects are required where as well as what actions must be performed

This reveals the adventure to be very complicated but totally fair — more or less the ideal state The plot involves escaping from Colditz and then blowing up a bridge — you will find it very, very difficult indeed

Program	*Colditz Adventure*
Price	*£6 95*
Micro	*Spectrum 48K*
Supplier	*Phipps Associates* *172 Kingston Road* *Ewell* *Surrey KT19 0SD*

GHOULISH

More from Virgin, this time it's a text adventure for the Spectrum *Atlas Assignment* has you in search of the American nuclear defence plans stolen by a man called Atlas — this cartographical reference is, as you will discover, not irrelevant to playing the game

There is superficially nothing really new here — standard two word entry etc In fact though, a quick play suggested the game was imaginative — many of the locations have shadowy figures lurking in them — an amiable drunk or a baddie? There is also a micro Jet that isn't to difficult to find but where do you tell it to go? Such mysterious questions abound and I got quite hooked Well worth a play

Program	*The Atlas Assignment*
Price	*£5 95*
Micro	*Spectrum 48K*
Supplier	*Virgin Games* *61/63 Portobello Road* *London W11 3DD*

LOW LEVEL

Most independant witnesses would agree that Digital Integration's *Flight Pilot* is the best flight simulation program for the Spectrum, beating even Psion's highly regarded offering into second place

Night Gunner is the companies most recent release and despite the cassette cover and title is really a different sort of game entirely — for one thing you don't need any (well not much) piloting skill at all

The game involves fighting and bombing your way through 30 missions before being rewarded with the ultimate challenge of bombing the enemy base Within each mission there are a number of elements requiring different sorts of skill — low level attacks where the danger of crashing is great, defending the plane against fighters, blitzing tanks etc

The graphics and more surprisingly, the sound effects are superb (it's almost worth



crashing just to hear them) the 3D is very well done and Ultimate would be happy to put this one out Who are Digital Integration anyway?

Program	*Night Gunner*
Price	*£6 95*
Micro	*Spectrum 48K*
Supplier	*Digital Integration* *Watchmoor Trade Centre* *Watchmoor Road* *Camberley* *Surrey*

DIET COUNTER

Although by and large, most computer addicts are not over weight (they seldom remember to eat) there are a growing number of programs for them should they decide to diet

The latest is called *Calorie Controller* but really it's a simple filing system which comes with 100 foods and the number of calories they contain

Program	*Calorie Controller*
Price	*£5 95*
Micro	*Spectrum*
Supplier	*S D Micro Systems* *PO Box 24* *Hitchin* *Herts*

New Releases is designed to let people know what software is coming on to the market. If you have a new game or utility which you are about to release send a copy and accompanying details to New Releases Popular Computing Weekly, 12-13 Little Newport Street WC2R 3LD

Top 10

Vic 20
1 ( ) Snooker (Visions)
2 (2) Krazy Kong (Interceptor)
3 (3) Wizard and the Princess (Melbourne House)
4 (1) Flight 015 (Ferranti Davenport)
5 (6) Jet Pac (Ultimate)
6 (9) Grid Runner (Llamasoft)
7 (8) Gomoku (Imagine)
8 (7) Snowman and Mothra Moon (Commodore)
9 ( ) Race (Commodore)
10 (-) Super Vaders/Bomber Run (K tel)

Dragon
1 ( ) Chuckie Egg (A&F)
2 (7) Up Periscope! (Beyond)
3 (8) Pedro (Imagine)
4 (6) Hungry Horace (Melbourne House)
5 ( ) Devil Assault (Microdeal)
6 ( ) Ring of Darkness (Wintersoft)
7 (10) Frogger (Microdeal)
8 (5) Kriegspiel (Beyond)
9 ( ) Dragon Chess (Oasis)
10 ( ) Scramble (Microdeal)

ZX81★
1 ( ) Mothership (Softsynch)
2 (3) Krazy Kong (PSS)
3 ( ) Fantasy Games (Phipps)
4 (-) Flight Simulation (Psion)
5 (-) Space Raiders (Psion)
6 (5) Asteroids (Quicksilva)
7 (1) Scramble (Quicksilva)
8 (-) 1K Chess (Artic)
9 (4) Football Manager (Addictive Games)
10 ( ) Defender (Quicksilva)
★All 16K
(Figures compiled by Boots/Websters)

Commodore 64
1 (3) Krazy Kong (Interceptor)
2 (6) Boogaboo (The Flea) (Quicksilva)
3 ( ) Revenge of the mutant camels (Llamasoft)
4 ( ) Superfiles (Commodore)
5 (2) Music Micro (Software Projects)
6 (10) Chuckie Juggler (Ocean)
7 ( ) Depth Charge (Commodore)
8 ( ) Mr Wimpy (Ocean)
9 ( ) Tank Atak (Supersoft)
10 ( ) The Hobbit (Melbourne House)

BBC★
1 ( ) Mr Wimpy (Ocean)
2 (3) Chuckie Egg (A&F)
3 (2) Fortress (Pace)
4 ( ) Daredevil Dennis (Visions)
5 (8) Battle Tanks (Superior)
6 (5) Chemical Simulations (Acornsoft)
7 (-) Penguin (Postern)
8 (-) 3D Space Ranger (Microbyte)
9 (6) Cosmic Kid (Superior)
10 (-) Saloon Sally (Paten)
★ All model B
(Figures compiled by Mass Management Ipswich 0473 [illegible])

Atari
1 (1) Rally Speedway (Adventure International)
2 (2) Wallord (Warlock)
3 (5) Saga 5 The Count (Adventure International)
4 (4) Blinky (Cosmi)
5 (3) Caverns of Battle (Gbase)
6 (-) Zaxxon (Datasoft)
7 (6) Preppie (Adventure International)
8 (-) Astro Chase (Parker Brothers)
9 (-) Arrow of Death Part 2 (Channel 8)
10 (1†) Sewage Fiend (Starrade)
* Cassette † 32K Disc
(Figures compiled by Deans Computers, Birmingham 021 632 6458)

Spectrum*
1 (2) Chequered Flag (Psion)
2 (—) Ant Attack (Quicksilva)
3 (5) Hunchback (Ocean)
4 (—) Fred (Quicksilva)
5 (4) Atic Atac (Ultimate)
6 (—) Cyrus is Chess (Intelligent)
7 (3) Scuba Dive (Durell)
8 (6) Flight Simulation (Psion)
9 (7) Lunar Jetman (Ultimate)
10 (9) Snowman (Quicksilva)
* All 48K except where noted. + 16K
(Figures compiled by W H Smith and Son, London)

Books
1 (8) Interfacing Projects for the BBC Micro *Smith* (Addison Wesley)
2 (8) Mastering the Commodore 64 *Jones and Carpenter* (Harwood)
3 (3) Advanced Graphics with the BBC Microcomputer *Angell and Jones* (Macmillan)
4 ([illegible]) Disc Systems for the BBC Micro *Sinclair* (Granada)
5 (1) BBC Micro Disc Companion *Lawden* (Prentice-Hall)
6 (-) Introducing Logo *Allen* (Granada)
7 (-) The C Primer *Hancock* (Byte)
8 (-) Complete Forth *Winfield* (Sigma)
9 (5) 68000 Assembly Language Programming *Kane and Leventhal* (Osborne)
10 (6) Spectrum Hardware Manual, *Dickens* (Melbourne House)
(Figures compiled by Watford Technical Books, Watford (0923) 23324 Prestel 39844)
(Last week's position in brackets)

Book Ends

PERSPECTIVE

Designs from your Mind is another one of those horrendously expensive but excellent books from America. It is about using the graphics on Atari machines to the fullest extent, and concerns itself as much with design and perspective techniques and with actual programming

In many ways the book reads like a good school textbook should, with clear examples, recapitulations of new information and plenty of pictures and diagrams

This approach of taking the 'art' part of computer graphics as seriously as if the TV screen was a piece of paper, proves very illuminating

Book *Designs from your Mind*
Price *£13 45*
Micro *Atari*
Supplier *Prentice/Hall International 06 Wood Lane End Hemel Hempstead Herts HP2 4RG*

RESTRICTED

Goldstar Software whose programs we have mentioned in Popular has, as another string to its bow, a book division called Dorling Kindersley

The first products are a series of step by step books on programming for all the main micros

The books are excellent, at least in terms of the way they use lots of colour and screen displays to clearly explain exactly what to do As a series they could form the best "basic introduction" to programming I've seen But there's the rub — each section is so clear because it restricts itself to a limited area — if you want to cover the whole area it'll cost you a lot

Book *Step by Step*
Price *£5 95*
Micro *Spectrum*
Supplier *Dorling Kindersley (Dept MP) 9 Henrietta Street London WC2E 8PS*

SID CHIP

Sprites and Sound on the Commodore 64 is the latest of Pete Garrard's torrent of books on the Commodore machines

Aside from some good advice and tips what this book gives you is a number of very useful programs to access the sprites and sound very much more easily I particularly liked the sections on synthesizers and the Sid chip

Book *Sprites and Sound on the Commodore 64*
Price *£6 95*
Micro *Commodore 64*
Supplier *Duckworth The Old Piano Factory 43 Gloucester Crescent London NW1*

This Week

Program	Type	Mand	Price	Supplier
Games Pack 4	Arc	Aquarius	£5 95	Processor
Demolator	Arc	BBC	£6.95	Vision
Battle Planet	Arc	BBC B	£6.95	ISP
Monsters and Magic	Ad	BBC B	£6 95	ISP
Calc Result	Ut	Commodore 64	£99 00	Handic
Calc Result Easy	Ut	Commodore 64	£49 95	Handic
Flight Path 737	S	Commodore 64	£7 95	Anirog
Get Off Garden	Arc	Commodore 64	7 00	Interceptor
Gyropod	Arc	Commodore 64	£6 90	Taskset
Wheelin Wallie	Arc	Commodore 64	£7 00	Interceptor
Sunken City	Ad	Dragon	7 95	Salamander
Type and Print	Ut	Dragon	£6.95	D Hill
Maxima	Arc	Memotech	£8 95	PSS
Board/Dice	S	Newbrain	7 60	Ebersoft
Busy	Ut	Newbrain	£172.50	Ebersoft
Busyfiles	Ut	Newbrain	80 00	Ebersoft
Busyfiles 2	Ut	Newbrain	£71 35	Ebersoft
Catering	Ut	Newbrain	£16.90	Ebersoft
Dice	S	Newbrain	£11.25	Ebersoft
Gourmet	Ut	Newbrain	£8 95	Ebersoft
Housekeeper	Ut	Newbrain	£63.25	Ebersoft
Tax	Ut	Newbrain	£16 80	Ebersoft
Character Generator	Ut	Spectrum	£6.95	ISP
Pat Spy	Ad	Spectrum	£7 95	Postern
3D Spell	Ed	Spectrum	£6 95	Camel
Chopper X1	Arc	Spectrum	£6 95	R&R
Galaxy Warlords	Arc	Spectrum	£6 95	R&R
Geography	Ed	Spectrum	£8 95	Thor
Guitar Tutor	Ed	Spectrum	£4 50	Harlequin
Screen Machine	Ut	Spectrum	£6.95	ISP
Speciel	Ut	Spectrum	£6.95	Jaytronics
Spectrum Sprites	Ut	Spectrum	£7 95	ISP
Spellbound	Arc	Spectrum	£5 95	Beyond
The Multi File	Ut	Spectrum	£9 95	ISP
The Tebbit	Ut	Spectrum	£8 95	Applications
Air Traffic Control	S	ZX81	£4.95	Hame

Key Ad — adventure/Arc — arcade/Ed — education/
S — strategy simulation/Ut — utility

The Week is a new section that covers all the new software coming on to the home micro market each week. All suppliers should send details of their new programs to This Week, Popular Computing Weekly, 12-13 Little Newport Street, London WC2H 3LD

Ziggurat



Is it education

I used to think — actually I never used to think about educational software having loftier matters to consider, such as how long to opening time Pressed for an opinion, I'd have expected the stuff to be worthy and thill, selected by that rigorous screening which during O-level Eng Lit kept my pure young mind from the pollution of living authors.

Then the *Sunday Express* dreamt up their feature on educational software Being involved with this book *Micromania*, I landed on the panel of alleged experts It was hell trapped all day in the Café Royal with a litter of Spectrums and BBC Micros (some even working) and endless schoolkids reducing everything to rubble in the name of Software Evaluation Peering over their shoulders I gazed upon the awesome vasts of state-of the-art educational software Worthy and carefuly screened? Believe me, games like *Frogger* or *PacMan* are not only more exciting but — with their training in how to cross roads and dodge the fuzz — a lot more educational.

What should teaching programs do? Hold a kid's attention I suppose and painlessly teach something Also the something should be worthwhile too many of that day's programs chiefly taught you how to "play" the program itself, without relation to the real world. Thus *Amazing Ollie* ("Learning about numbers") and a set called *First Steps with the Mr Men* educate almost exclusively in how to move cursors round the screen Computing for the sake of computing

Again familiar complaint, educational software isn't up to the pictures on the boxes. The thrilling space-war imagery of *Hot Dog Spotter* fades on sight of the actual display, dullish graphics featuring the occasional fall of a blob with dots on. You count the dots and hit the relevant key, thus being educated in number recognition (fair enough) finding the Spectrum's number keys bashing them hard enough to have any effect, and slumping across the keyboard in catatonic after about three minutes

The programs lack imagination *Timeman* is aimed at the doubtless vast number of kids who can't read clocks but are fluent with numbers and know without being told that you hit *Return* after each number *Children from Space* uses the exciting idea of space visitors who, unexcitingly, need their English corrected If your "corrected" sentence is wrong you type the whole thing again — no cursors here!

Symmetry is a pattern-drawing program which might teach a kids geometry The initial display explains how to draw lines by hitting 1 to go north 2 to go northeast, 3 to go east etc You're then advised to write all this down, since you won't be told again The prosecution rests

Words Words Words was my favourite as a professional writer I like to see potential rivals discouraged in early life The challenge is to spot what the graphics are supposed to be so when something appeared which looked like a large vole or small megatherium, our nine-year-old playtester scored for answering "dog" Next the castle scene a recognisable portcullis! "Portcullis," she typed Not on your nelly said the program No such word! Only "gate" would do.

Educational software seems uneasily aware of its tediousness. Biggest hit with the kids was *Facemaker* which despite promotional guff about "teaching children how to draw" was blatantly not educational just another exercise in computerised funny faces. *Time Traveller* tries to teach history in multiple choice quizzes ("The Bronze Age was famous for structural linguistics, votes for women punk rock, bronze?") the kids skipped through these to play the dodge-the-nasties arcade games thrown in to make history interesting Thus the lasting educational impression was that Ancient Brits spent their days being chased by wolves through forests Tudor folk by dagger-wielding courtiers through palaces Victorians by rats through sewers

So *is* educational software educational? Not very It's great virtue, novelty, wears off too quickly — kids are blasé about computers even if we addicts aren't. Looking at today's great splurge of trendy "educational" cassettes, I can't help remembering the trendy skateboard rinks so many councils were building a few years back — or the language laboratory at my old school, abandoned when the novelty faded and the O-level results dropped through the floor

David Langford

Puzzle

Reverse digits

Puzzle No 103

When Cyndy became a 'young executive' she decided that the one essential item to complete the image was a new briefcase

You know the sort of thing — real leather case hand stitching gold plated fittings, gold leaf initials and a personally selectable combination lock

It was the lock that caused the problem as she could never remember the combination Not, that is until she hit upon the following idea You see, there were two fastenings each with its own independently settable four-digit code She has



now set the locks so that the combination of both have the same digits but one has its digits in reverse order

In case you are wondering how this helps Cyndy, she just has to remember that one number is just twelve times the other

There you go! It's just a simple step to work out what the two code numbers are if she should ever forget. Or is it?

Solution to Puzzle No 98

In the program all the possible amounts are checked against the known facts. Note that the original number of pounds must have been greater than the number of pennies

```
10 FOR L = 2 TO 99
20 FOR P = 1 TO L
30 LET A = L * 100 + P
40 LET B = P * 100 + L
50 IF (A−B) − 50 = A/2 THEN PRINT "ORIGINAL SUM
   ";A
60 NEXT P
70 NEXT L
```

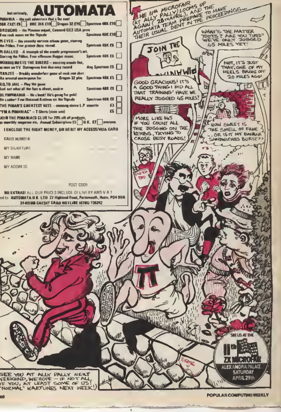
Running the program shows that Tom originally had £66 32 and he lost £32 66 A further loss of 50p left him with a balance of £33 16 — half of the original amount.

Winner of Puzzle No 98

The winner is M Docherty, Grand Avenue, London N10, who receives £10

The Hackers





THE 11th MICROFAIR (AT ALLY PALLY) LOOMS UP AGAIN (28th APRIL), AND THE AUTOMATA TEAM PREPARE TO MAKE THEIR USUAL DENT IN THE PROCEEDINGS...
JOIN THE
WHAT'S THE MATTER TOOTS? ARE YOU TIRED? WE'VE ONLY JOGGED 45 MILES YET!
NOT, IT'S JUST THAT, ONE OF MY HEELS BROKE OFF 20 MILES AGO!
GOOD GRACIOUS! IT'S A GOOD THING I DID ALL THAT TRAINING! HAVE WE REALLY JOGGED 45 MILES?
MORE LIKE 145 IF YOU COUNT ALL THE JOGGING ON THE KERBS, TRYING TO CROSS BUSY ROADS!
HOW SWEET IS THE SMELL OF FAME ...OR IS IT MY BANANA SANDWICHES BURST??
SKETCH PAD
SEE YOU AT ALLY PALLY NEXT WEEKEND, WE HOPE – IF NOT ALL OF YOU, AT LEAST SOME OF US! ("NORMAL" KARTUNES NEXT WEEK!)
SEE US AT THE
11th ZX MICROFAIR
ALEXANDRA PALACE
SATURDAY
APRIL 28th